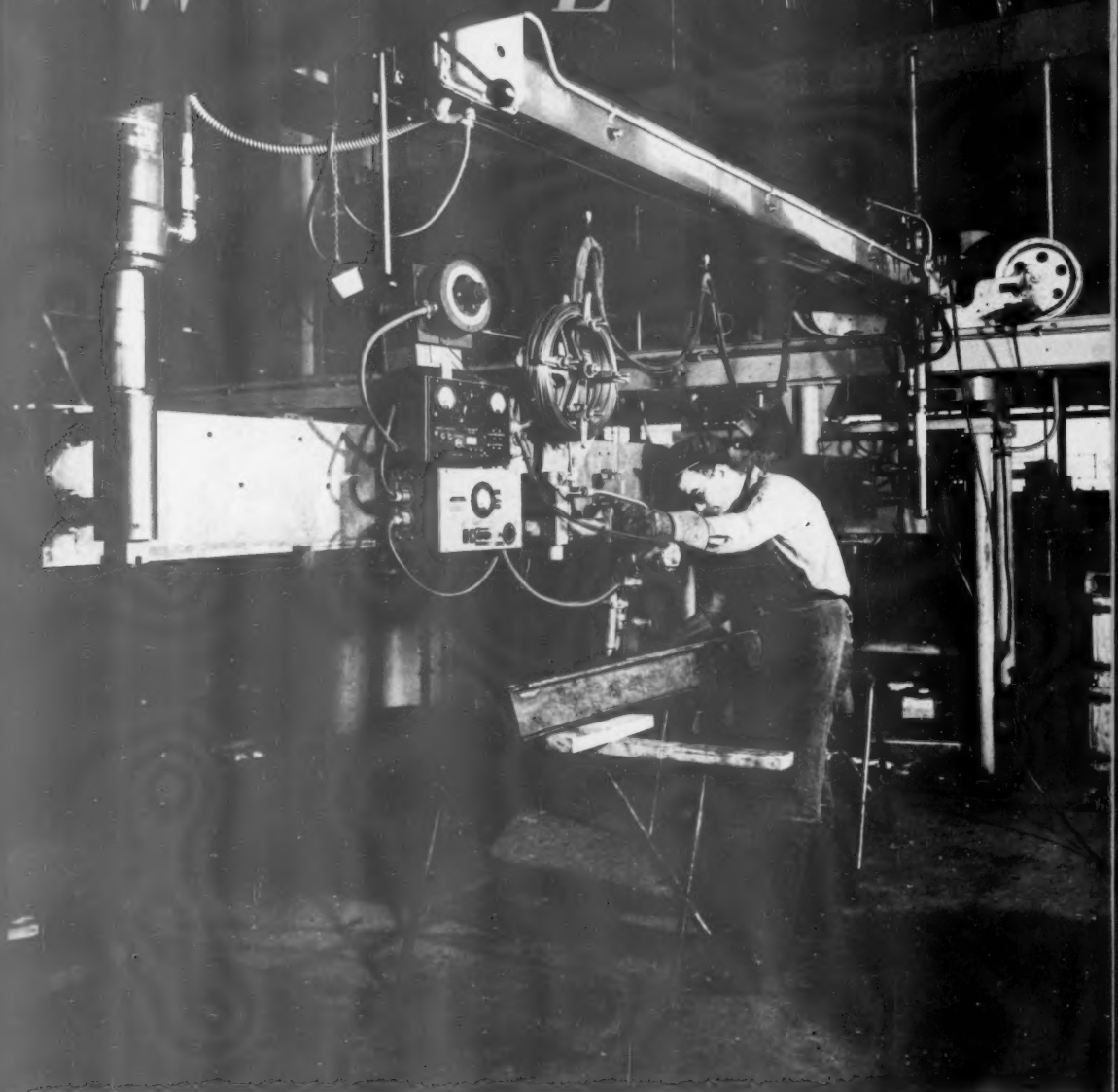
NOVEMBER, 1952 35¢

THE WELDING ENGINEER



Better and Faster Welding . . . . . see page 36

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—product performance that can come only from a "know-how" that has grown through actual service since the early days of the construction industry.

—an ability to cooperate in pioneering new wires to meet or anticipate industry's growing needs.

In the years that follow This Belden Program Is—

TO BE CONTINUED

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The conductor is composed of many electrically pure copper strands. Each strand is accurately drawn and annealed. Annealing makes the wire soft and flexible.

Thousands of copper strands are grouped into seven divisions, six of which are positioned concentrically around the center group. The strain of flexing is distributed equally throughout all the strands.

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The separator on Belden cable consists of tough kraft paper armorized with aluminum foil. This is an exclusive development.

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The Belden jacket compound has been scientifically formulated with the latest in protective ingredients to insure maximum resistance to the destructive effects of heat and time. This rubber jacket is tested for aging in an oxygen bomb under heat for 14 days, approximately equivalent to 10½ years' service. It still remains lively and flexible after such exposure.

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Welding CABLE

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Advanced Engineering

. . . rugged, heavy duty construction . . . dependable, trouble-free service . . . long life . . . and extra reserve capacity—these are the things that have made the Hobart Gas Engine Drive DC Arc Welder the choice of experienced operators everywhere.

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Electric Drive DC Welder

If you're interested in better, faster, lower cost welds, you owe it to yourself to compare a Hobart Electric Drive DC Arc Welder—point for point—with all other machines on the market. Hobart superiority is not a claim, but a fact substantiated by the experience of thousands of users over a long period of years.

Make this comparison now—and see for yourself. The coupon will bring you full details.

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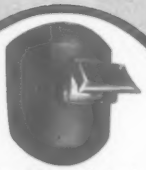

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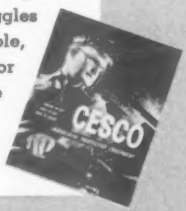

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NOVEMBER, 1952

Cover: *Three-dimensional welding set-up at Tractomotive Corp., Deerfield, Ill. Details on page 36.*

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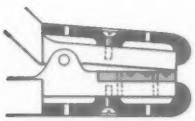

Something new has been added to these three Jackson Electrode Holders.

Not only are their tongs made of a heat treated superior 98% copper alloy—

Not only has it been proven in tests that these Jacksons have extra *tensile strength*, extra *hardness*, and extra *conductivity* over other makes of copper alloy holders—*but* . . .

The latest "EXTRA" is in the lower jaws that are now made *replaceable*, without having to replace the entire lower tong.

For no matter how strong we make them, it's the lower jaws that have the grooves to grip the rods, and tend to wear out faster than the rest of the holder.

It's these *replaceable jaws* that will make these Jackson Double-A models your preference for long, economical performance.

Call your Jackson distributor for prompt delivery of these and many other Jackson Electrode Holders, Ground Clamps and Cable Fittings, Eyeshields, Safety Goggles.

Standard Models Continued

Long-time favorites, Jackson insulated copper alloy holders with *one-piece tongs*, will, of course, be continued. They are of the same capacity as the double-A holders of like numbers, above.

Cables may be soldered, brazed, or clamped in place mechanically.

Model A-1	Model A-3	Model A-3S
$5.50	$7.00	$7.50

All prices lower in quantity.

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WORLD'S LARGEST MANUFACTURER OF ELECTRODE HOLDERS

NEWS FROM WASHINGTON

NPA Asks Development of Domestic Rutile

MORE self-sufficiency in rutile is highly desirable, says NPA's director of the Miscellaneous Metals and Minerals Division, William A. White, Sr. This vitally essential material goes into electrode coatings, ferro-alloys, aluminum, fibre glass, metallic titanium and chemicals.

Today three-fourths of our supply comes from Australia, the principal world source. We used about 19,000 tons in 1951 and 27,000 tons in 1952. Remainder of our supply comes from domestic production, principally from the old beach sands of Florida. There are other known deposits in this country that aren't being worked.

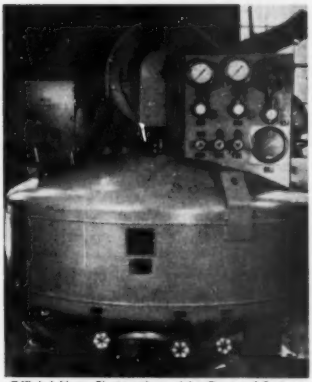
Greater use and further development of rutile substitutes are needed, says Donald S. Phelps, acting chief of the Miscellaneous Metals Section. Substitutes include tanarc, made from steel slag, and brookite, a mineral available in Arkansas and possibly elsewhere in this country.

Some industry people believe brookite can be substituted for rutile in many cases, and tanarc can be used with rutile in welding rod coatings to reduce the amount of rutile needed. Principal users of rutile by the military are by the Navy in ship building, Air Force in jet engines and the Army in tanks.

For your information: rutile is a reddish-brown sand containing titanium dioxide.

24,000-Mile Boost in 1953 Pipelines

EXPANSION goal for the gas utility industry for 1953 is 7,200 miles of large pipe and 17,700 miles of small pipe. According to DPA, who announced the plans, average outside diameter of the large transmission pipe will be 20 in. and the average weight is 207.5 net tons per mile. For the 7,200 mileage, this means 1,494,000 tons of pipe.



Official Navy Photo released by Dept. of Defense

OXYGEN plants capable of making aircraft carriers self sufficient in oxygen for high-altitude jets are a new Navy development. This storage tank will contain liquid oxygen produced aboard ship.

The small pipe will be used for field, gathering and distributing purposes and will average 6⅝ in. in diameter. Weighing 39.5 tons per mile, the 17,700-mile goal will require 699,000 tons of pipe.

Such expansion goals provide the basis by which the government can assist in the achievement of the needed expansion through accelerated tax amortization or other means. Establishment of a goal does not constitute a commitment to furnish controlled materials as of any given quarter.

Electrode Price Rise May Be Allowed Soon

AN INDUSTRY Advisory Committee meeting for the welding industry, called by the office of Price Stabilization for October 27, is past the deadline of this issue of THE WELDING ENGINEER, but an increase in electrode prices is a foregone conclusion. Some questions about welding machine prices will probably be asked at the same time.

If electrode makers are able to prove a hardship created by the present prices, OPS will probably allow an increase. This is the way it can come about:

OPS will cover the nation in a spot check, take "samples" as they are called and thus determine what action should be taken. The pronounced shortage of "single-line" companies, a problem peculiar to the welding industry, will make the survey by OPS more difficult. Single-line companies are defined as those devoted wholly to one industry.

There are five good reasons for an increase in electrode prices: (1) increased wire costs; (2) increased labor costs; (3) increased costs of coating materials; (4) costs of development; (5) scarcity of coating materials. In connection with number 3, it should be mentioned that the price of rutile has jumped 100% since the controls on it were removed.

Boiler Pipe and Tubing Industry Feels Shortage

BOILERMAKERS and other users of boiler pipe and tubing are in dire need of pipe. Part of the shortage is caused by the fact that pipe sizes are not well standardized. Steel mills are reluctant to accept orders for certain sizes, for which there might not be a large demand. Standardization would benefit the mill, the fabricator and the end user.

A conference will be held soon between NPA and industry representatives to see what can be done to alleviate the pipe situation.

NPA is also waging a concerted drive on the military to use welded tubing wherever possible. Seamless-tube mill capacity is stretched to the breaking point, but welded-tube mills can take up considerable slack.

Army May Do Own Electrode Packaging

IF THE PRESENT plan of the Raritan Arsenal is approved, all packaging of electrodes and welding rod pur-

(Continued on page 6)

NEWS FROM WASHINGTON (Continued from page 5)

chased by any branch of the Army will be packaged at Raritan. The plan is for the branches to buy the rod, either in commercial containers or in 50-lb ammunition cylinders, and the arsenal will repackage according to military requirements.

Packages will be of the cardboard sleeve or telescopic-end type. One package will hold 10 lb of coated steel electrodes or 5 lb of coated aluminum electrodes, in either 14-in. or 18-in. lengths.

Army officials feel that they are in a position to do the packaging at a saving over industry. They are hoping manufacturers will be more willing to bid on Army orders if the Raritan plan goes through.

More Aluminum and Less Copper Seen for Future

INDUSTRY has been asked by DPA Aluminum Administrator Samuel W. Anderson to increase the production of primary aluminum 200,000 short tons annually by 1955 over the previous expansion goal. This will bring the total domestic capacity to 1,746,000 short tons.

After taking into account imports from Canada and other sources and secondary production from scrap, the estimated total will reach 2,375,000 short tons for an increase of 1,168,300 tons over 1950.

Whereas all that is needed for increased aluminum production is more pots and electricity, increased copper requires more mines, which cannot be developed quickly. Hence the prospect is that the copper shortage (and the controls it has created) will be with us for a long while.

Scrap shipments of copper have declined; domestic production is down (partly caused by anticipation of a price increase), and we did not receive our full third and fourth quarter allotments from the International Materials Conference. The gloomy picture is further confused by the inconsistency of a domestic price of 24½ cents per lb and an import price of 36½ cents per lb.

CMP Gradually Being Liquidated

PROBABILITY is strong that the Controlled Materials Plan will be out of the Washington news on February 1, 1953. By that date, CMP will have used up its funds, and, unless Congress appropriates more money, that will be the end of this agency.

Possibility for an increased CMP life is foreseen if the materials supply situation takes a turn for the worse. However, the picture now seems to be improving.

Manganese Imports Showing Improvement

MANGANESE imports from Africa, Asia and Latin America have more than offset the loss of production caused by the "iron curtain" shutting down. U. S. steel manufacturers have boosted imports of manganese enough to make up the difference since "trade" was curtailed with Soviet-controlled nations.

Manganese is a vital ingredient in steelmaking, and we have little of it in this country. About 90% of the manganese used by the steel industry must be imported, according to the American Iron and Steel Institute.

Priorities Assistance Form Now Available

NATIONAL Production Authority has issued a special form for priorities assistance entitled "Request for Priorities Assistance" (NPAF-138 Revised). Applicants who seek special assistance to expedite production must demonstrate that it is needed for: (*a*) a military or Atomic Energy Commission contract or program; (*b*) to prevent serious delay in completion of an important industrial, public utility or construction program; (*c*) to carry out a program or activity essential to the health, safety or welfare of the community or (*d*) to overcome an unreasonable, exceptional and proved hardship.

Surplus Tool Agency Really on the Ball

NPA's "Machine Tool Inventory Center" reports that it has inventoried 30,000 government-owned tools and has leased 2,117 pieces of equipment to military and defense-supporting contractors. The 30,000 tools are estimated to have an aggregate value of about $450,000,000 at today's replacement costs. Tools leased so far are valued at $29,730,000.

The Machine Tool Center, formally identified as PECIG, (Production Equipment Central Inventory Group) is operated by NPA's Metal Working Equipment Division.

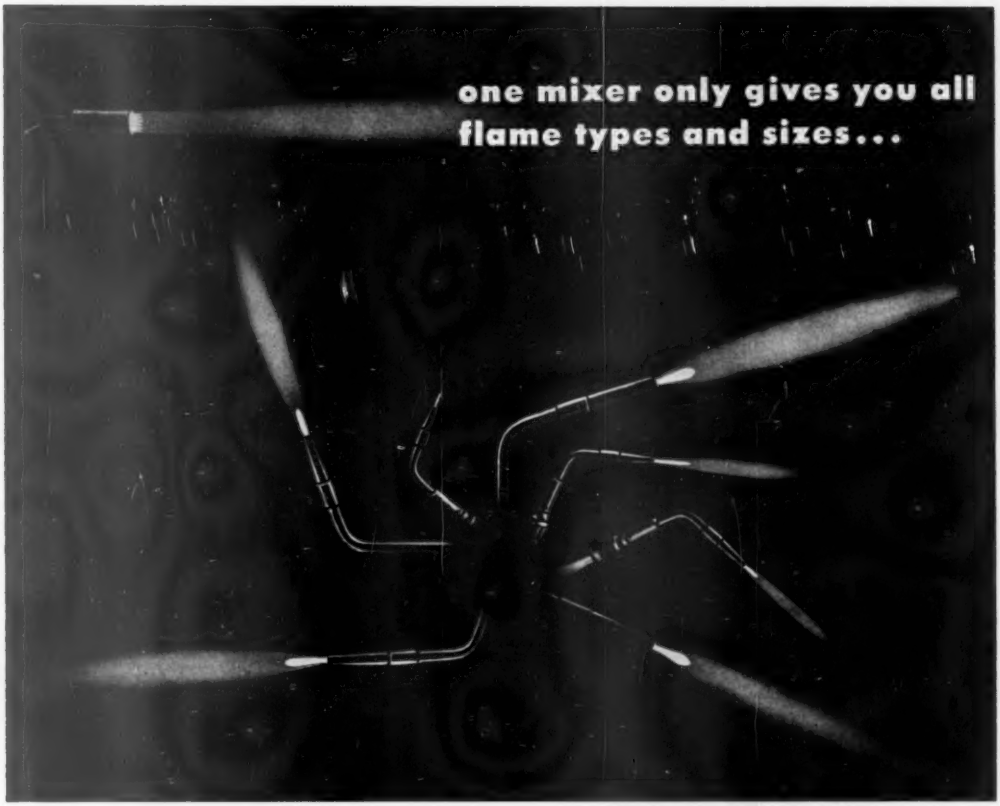
"In these days of constant criticism of you and other government agencies," the Allison Division of General Motors Corp., Indianapolis, wrote of PECIG, "we feel sure you will be pleased to hear of someone who is able to report a real satisfaction.

"We had a very acute manufacturing problem here at our plant a short time ago, which required 15 arc welders. These units were screened at the Central Inventory. They were inspected and shipment requested through PECIG, which was informed that our production of jet engines would suffer if the welders were not received within 20 days.

"The welders were shipped with unbelievable speed."

40% Tin Solder Okayed for Body Work

THE USE of body solder in the production of automobiles and trucks is permitted under an amendment to NPA order M-8, issued September 23. The amendment strikes the phrase "for joining purposes" from the provisions for purchase without certification of solder containing no more than 40% tin by weight and adds a clause making it clear that the use limitations for such solder, contained in schedule II of the order, are still applicable.



You won't need extra torch mixers when you use the modern welding equipment made by San Francisco's oldest producer of fine apparatus for flame cutting and gas welding.

Save the added cost of numerous mixers—limit the nozzle weight to be carried by the operator — lower your initial and your future costs — buy the efficient and modern equipment made by *National*

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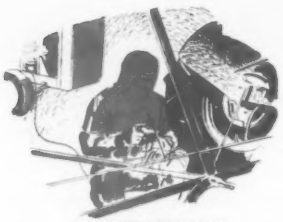
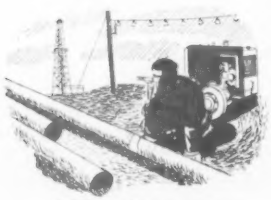


FIELD MAINTENANCE

FARM AUXILIARY POWER



PIPELINE CONSTRUCTION

A UNIT WITH MANY APPLICATIONS!

The new Westinghouse Engine-Driven Welder was developed for construction and field-maintenance operations. It provides 200 amperes of d-c current for welding. It also provides 3,000-watt, 110-volt, a-c current for stand-by power. By simply plugging into convenient receptacles on the a-c power panel, the operator may obtain power for drills, grinders, pumps, lights and other electrical equipment.

The standard unit is skid mounted for truck transport or may be mounted on a high-speed, pneumatic-tired trailer. Ready for field service, the unit weighs only 1,150 pounds and measures 39½″ high by 62⅜″ long in the stationary model.

The standard model has hand-crank start. Battery start is also available.

A large toolbox for storing cables, helmets, electrodes, tools and other accessories is also included if desired.

FOR MORE INFORMATION

Write to the Westinghouse Electric Corporation, Welding Division, P. O. Box 868, Pittsburgh 30, Pa., or contact your nearest Westinghouse representative. Ask for Welding Booklet B-5455.

J-21611

welder PLUS stand-by power!

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1 CONVENIENT A-C POWER TAKE-OFF

3 kw stand-by power can be obtained without using a bulky, auxiliary rotating machine. The operator simply plugs into one of the convenient 110-volt, a-c receptacles. This stand-by power is extremely beneficial when ordinary sources of power are not available.

2 IMPROVED WELDING GENERATOR

Closely coupled to the driving engine, this new improved generator makes it easier to strike and maintain a steady welding arc. No exciter is required. Welding current ranges from 40 amperes at 20-load volts to 250 amperes at 40-load volts.

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The new welder is equipped with a performance-proved, 4-cylinder, liquid cooled, Ford industrial engine. It is rated 30 maximum and 25 continuous horsepower at 1,800 rpm. The engine is equipped with oil filter and oil-bath air cleaner.

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Through him you are offered the world's most complete technical library on joining aluminum—"How-To-Do-It" movies, plus copies of a 186-page book covering all welding processes.

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PRESENTS

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OF HOW ARC WELDING ELECTRODES ARE MADE

"No Finer Electrodes Made... Anywhere"

A 22-MINUTE SOUND MOTION PICTURE IN FULL COLOR

MADE INSIDE ALLOY RODS' YORK, PENNSYLVANIA PLANT

Never before to our knowledge, since arc welding became of age as a major fabricating tool for American industry in the early 1930's, has any electrode manufacturer permitted the public to see how coated arc welding electrodes are made. The manufacturing processes and procedures have always been carefully guarded trade secrets.

Now, for the first time, *Alloy Rods Company* has filmed its entire manufacturing process in the interests of better trade relations and technical understanding . . . from the cold drawing of hot rolled rod to the packaging of its finished electrodes in moisture-proof metal containers. You can now see how arc welding electrodes are made.

"No Finer Electrodes Made . . . Anywhere" is not a sales film or promotional tool. It is technical and instructional . . . shot on the production lines and in the laboratories . . . to show those interested in better arc welding *why* we make electrodes this way. Prints of this film are available, without charge, to any reputable organization or institution.

WRITE, WIRE, OR TELEPHONE to Department M if you would like to use this film for any organizational or educational purpose. We will try to have a print available to fit your next open date.

ALLOY RODS COMPANY
YORK, PENNSYLVANIA

NO FINER ELECTRODES MADE . . . ANYWHERE

AR-12

3M Type C Discs put "smart finish" on dumb waiters!

STAINLESS STEEL WELDS are smoothed down in record time at the Hauenstein & Burmeister Company with Grit 24 3M Type C Discs. This Minneapolis manufacturer tried other methods—then chose these outstanding discs to rough-grind the weld on stainless steel dumb waiter doors and door frames.

Reason? 3M Discs *cut faster, wear longer.* Operators found that even after grinding four complete dumb waiter units, a 3M Type C Disc was *still usable* . . . gave *bonus* service for aluminum weld and general solder sanding.

And it's 3M Abrasives **ALL THE WAY** for this cost and quality-conscious company! Three-M-ite Cloth Belts smooth out rough-grind and finish before polishing. Tri-M-ite Sheets do the final blending and polishing.

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Send me more information on 3M Abrasive Discs.

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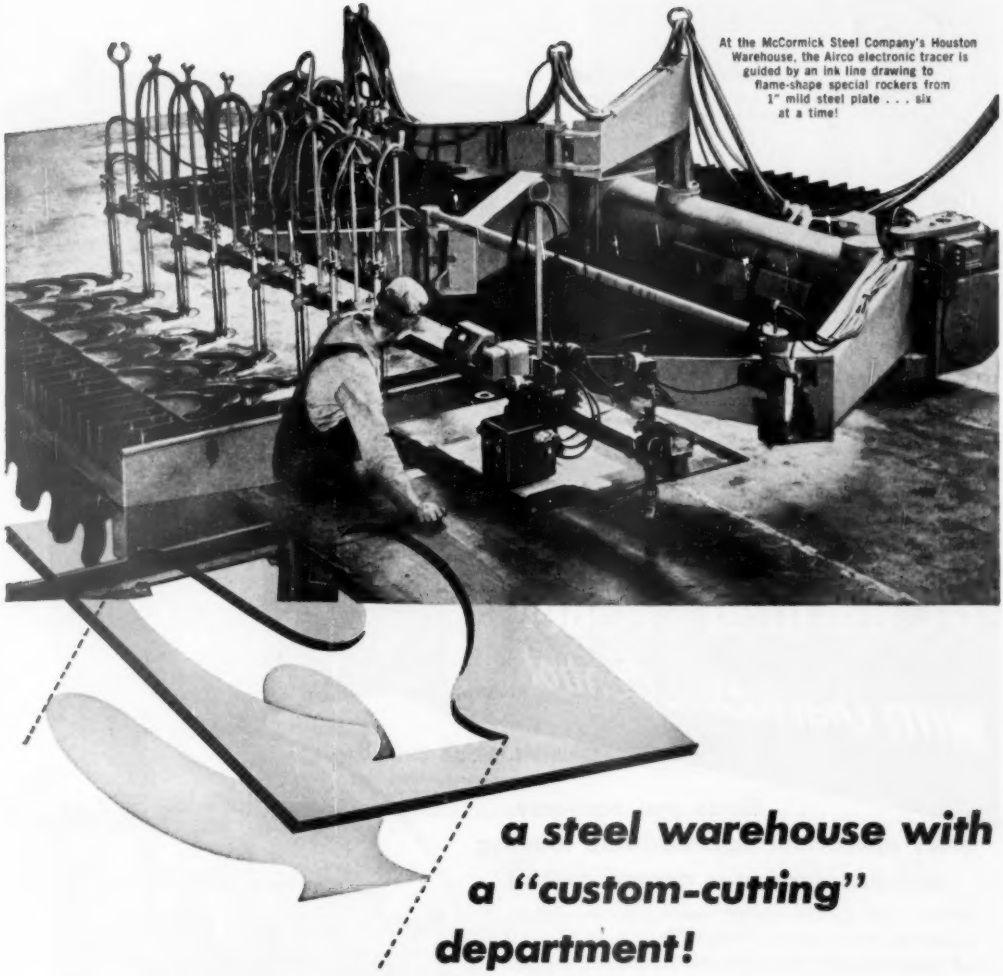

At the McCormick Steel Company's Houston Warehouse, the Airco electronic tracer is guided by an ink line drawing to flame-shape special rockers from 1" mild steel plate . . . six at a time!

a steel warehouse with a "custom-cutting" department!

That's McCormick Steel of Houston, Texas! By installing an Airco No. 50 multi-torch cutting machine, they've boosted steel orders with an entirely new type of service . . .

Here's how it works: customers supply an outline drawing or paper cutout of the required part. An "electronic eye" traces the guide with hairline accuracy. Irregular shapes, inside and outside square corners, obtuse angles, slim slots and intricate contours — the Airco No. 50 Travograph takes 'em all in stride. Circles up to 12 feet in diameter — thicknesses up to 6 inches! By keeping all 8 torches in operation, McCormick mass produces intricate shapes so accurately that further machining is, in most cases, unnecessary.

The Airco No. 50 Travograph cuts light plates, heavy slabs, billets or forgings . . . to minute tolerances . . . with virtually no limit on shape or size. Complete details are available by contacting your nearest Airco office.

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Saves on power costs under load — and during idle and no-load periods!

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New P&H DC Rectifier Welder with Dial-lectric Control

. . . Gives you economy, quiet operation, balanced-line loading, and instantaneous remote control

Now . . . you get low-cost DC welding current without a generator, from this new P&H DC Rectifier Welder — industrial twin to the famous P&H AC Dial-lectric Welder.

No troublesome mechanical devices to control amperage — simply turn a single radio-type knob. There are no moving coils or cores to cause delays and maintenance expense — no bearings, brushes, commutator, brush riggings, etc. to replace.

P&H extra-value features like these make this DC Rectifier a real buy: Thermal overload protection. Weather-proof housing. Primary line switch. Range switch. Remote control receptacle. Forced air ventilation. Hinged side covers. Heavy-duty lifting eyes.

New P&H Rectifiers are coming off the production line now. Two sizes: 200 and 300 Amps at 40 V. Be among the first to enjoy the savings this P&H welder helps you realize on power consumption and maintenance. Order your P&H DC Rectifier Welder today.

Ask your P&H representative or distributor for further information on this outstanding unit.

Here's low-cost DC welding power at its best — the P&H DC Rectifier Welder. Note the sturdy construction and absence of moving parts.

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RUBBER BUSHED WHEELS

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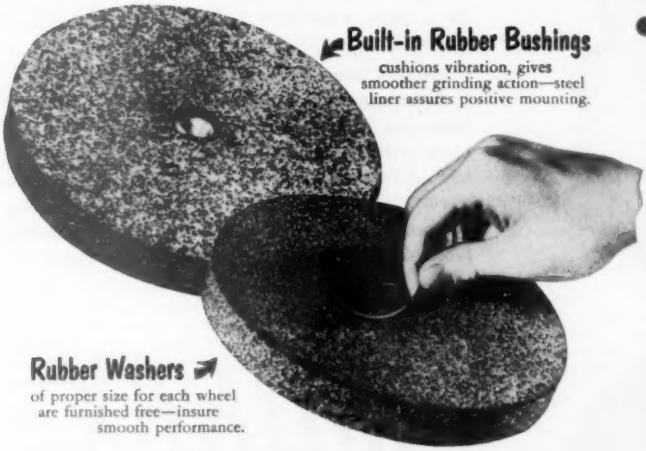
gives you a better finish...faster...at lower cost



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● We've engineered the "bounce" out of portable grinding operations—with dramatic benefits for you: you get higher production with less strain on the operator...you get more contact time on the work, and more pieces finished per day...you get a better finish because this smooth running wheel *with the built-in rubber bushing* maintains continuous contact without denting or gouging the work.

If you're not now using this work-saving, cost-cutting product by CARBORUNDUM on your portable weld grinding equipment, try it—then watch your production record climb! Call your CARBORUNDUM or distributor salesman, or write Dept. WE 81-56.

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Simple Procedure Change Licks Pin Holing

Porosity in horizontal fillet welds was occurring on heavy bases for diesel engines being manufactured by a large locomotive builder. Various makes of electrodes were tried with no improvement.

Metal & Thermit's local sales engineer was asked to investigate . . . quickly uncovered that the plate being used in certain portions of the weldment was off in chemical content. By positioning for flat welding, or, where this could not be done, by using Murex low-hydrogen electrodes, pin holing was completely stopped—production resumed—and parts already fabricated were completed instead of scrapped.

Your nearby M&T representative is qualified to give genuine assistance on any welding problem. Call on him when you need help. Make use of his broad background of experience in every phase of welding.

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Welding Info-Aids

201 TRACK RAIL WELDER—Dean Weld Machine, Inc., Oakland, Calif. 4-page two-color bulletin describes a packaged automatic welder-positioner for rebuilding crawler tracks, fabricating beams or hard-facing dozer blades. Welding bed, carriage and main controls are pictured and described.

202 DYE PENETRANTS—Manchester Oil Refinery Ltd., Manchester 17, England. 4-page booklet provides a quick description of "Supramor" electromagnetic flaw detection ink for the detection of cracks from stress, fatigue, heat treatment, shrinkage, grinding or forging. Some 15 grades of ink for various applications are listed and their properties described.

203 ANTI-POROSITY AGENT—Speckaluminite Co., Ossining, N. Y. Single-sheet bulletin tells about "Weldaluminite," an anti-porosity compound that is sprayed or brushed on the weld joint and allowed to dry before welding. Much more stable inert-arc welding on rimmed steel is claimed with no blowholes.

204 FLUX RECOVERY—Invincible Vacuum Cleaner Mfg. Co., Dover, O. New 6-page bulletin on recovery equipment for unfused submerged-arc flux describes the machine's primary separator and feeder tank. Four models of recovery unit for every size installation are clearly pictured and their specifications and capacities listed.

205 HARD-FACING GUIDEBOOK—Stoody Co., Whittier, Calif. Completely revised "Stoody Hard-Facing Guidebook" gives the low-down on rebuilding and hard-facing of earth-moving, mining, lumbering, cement and similar heavy equipment. Materials and methods are clearly discussed.

206 SOLAR BUTT WELDERS—Solar Aircraft Co., San Diego, Calif. 6-page, two-color folder tells about new butt-welding machines for inert-arc welding of smooth cylinders and the joining of flat strips and sheets. Type of welding equipment, standard models available, operating instructions, special clamps, variable speeds and different views of the equipment are presented.

207 WET BLASTING—American Wheelabrator & Equipment Corp., Mishawaka Ind. 6-page brochure shows the application of "wet blasting" to such work as die and mold finishing, die and mold maintenance, heat treat scale removal and surface preparation for plating. Fully illustrated, the bulletin shows parts before and after blasting and some typical installations.

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TO OBTAIN: (1) manufacturer's catalog or bulletin described on this page; information on (2) a new product item or (3) an advertised product, use the card sections printed below. Insert number of catalog or new products item or page number of advertised product (add initials of the advertiser if more than one ad appears on the page). THE WELDING ENGINEER will ask manufacturers to send the information requested.

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208 CUTTING ELECTRODES—Eutectic Welding Alloys Corp., Flushing, N. Y. 4-page bulletin describes "CutTrode" and "ChamferTrode" metal-cutting electrodes for cutting, piercing, grooving of stainless, brass, copper, nickel, steel, cast iron etc. Three applications of each are pictured.

209 WELDING SCHOOL—The Lincoln Electric Co., Cleveland 17. New 8-page, two-color booklet tells all about the welding school at Lincoln that has turned out 35,000 weldors since 1918. Special courses, equipment, costs and other information are included.

210 STAINLESS WELDING — Armco Steel Corp., Middletown, O. Two-color wall chart covers welding and soldering of stainless steel, including arc, gas, inert-arc, spot and soldering techniques and a reference table.

211 PHOSPHOR-BRONZE ELECTRODE—Weldwire Co., Inc., Philadelphia 25. Data sheet describes all properties of a new phosphor-bronze electrode for high strength arc welding on bronze and manganese steel. It may also be used for overlaying of phosphor-bronze on steel.

212 ALUMINUM BRAZING—Aladdin Rod & Flux Mfg. Co., Grand Rapids, Mich. Pocket-size bulletin gives plain directions on how to braze aluminum quickly and efficiently with Aladdin rod. Pictures show position of torch, brush and filler rod.

213 METAL-BONDING ALLOY—ChemoTec Div., Eutectic Welding Alloys Corp., Flushing, N. Y. 48-page catalog of procedure sheets and technical data on special low-melting-point organic metallic bonding agents contains a wealth of information on this new process. Types of jobs and the simple equipment needed are pictured and the various compounds are described.

214 WELDING TURNTABLE—Unique Turntable & Display Co., New York City 35. Single-sheet bulletin describes a small turntable for positioning weldments or other production items up to 300 lb in weight. Rotation speeds available, dimensions and special equipment are described.

215 CONSULTING ENGINEERS—Sam Tour & Co., Inc., New York City 6. 6-page folder explains the variety of technical services offered by the firm. These include research on new materials, development of products, processes and production methods, technical consultation, legal testimony and non-destructive testing in laboratory and the field.

216 BENDING MACHINES—O'Neil-Irwin Mfg. Co., Lake City, Minn. 32-page catalog tell about all Di-Acro tools for bending, rod parting, shearing, punching, braking and rolling. Many excellent pictures show each tool in operation and also the type of work that it produces. All pertinent data and specification are tabulated and clearly explained.

217 HEAT-INDICATING FLUID—Tempil Corp., New York City 10. Single sheet instruction bulletin offers supplementary information on the use of Tempilaq, a temperature-sensitive liquid. How to use it on glass, fast moving surfaces, in reducing atmospheres and other special conditions is explained.

218 INSERT SPOT WELD TIPS—Smith Bros. & Hughes, San Diego 10, Calif. 8-page, two-color bulletin on replaceable resistance welding insert electrodes provides physical and mechanical properties, tabulations of shapes and diameters available and special tips.

219 WELDED MACHINERY—The Pandjiris Weldment Co., St. Louis 10. 4-page bulletin EE-10 shows such welding-engineered equipment as a hydraulic tube bender, pallet-type conveyor, hydraulic skip hoist, expanding mandrel, production lathes, ingot and charging cars, roll transfer car and looping pit side guides. Last page is devoted to the "Weldmore" welding positioner and a 70-ton positioner for welding hopper cars.

220 WORTHINGTON TOUR—Worthington Corp., Harrison, N. J. 32-page pocket-size booklet illustrated by cartoonist-author Don Herold is a slyly humorous and informative booklet on Worthington's many products and operations. Included are welding positioners, pumps, Diesel engines, meters and many more items.

221 HYDRAULIC CYLINDERS—Miller Motor Co., Melrose Park, Ill. 8-page illustrated bulletin gives engineering, design, construction, mounting and dimensional data covering company's complete line of space-saving square-section hydraulic cylinders for 2,000-3,000 psi operation.

222 METALLIZED MOLDS—Metallizing Engineering Co., Inc., Long Island City 1, N. Y. Bulletin 99 tells how complex plastic molds can be made in 30 minutes. Method of spraying a master with "Spramold" wire, then a coating of aluminum bronze and finally with another coat of "Spramold" is fully explained.

223 WORKING WELDED TUBING—Armco Steel Corp., Middletown, O. Twenty-eight-page manual, "How to Fabricate Welded Steel Tubing," covers cutting, deburring, bending, swaging, punching, notching, drilling, joining, cleaning and finishing. Each subject is treated practically—"how to do it" and "what with."

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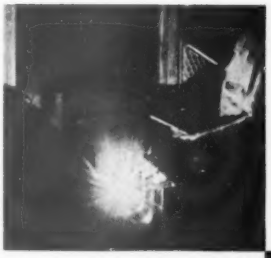
THE WELDING ENGINEER, NOV., 1952

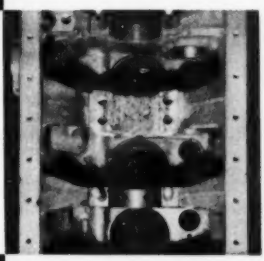
Don't scrap that crankcase

New Welding Technique
...salvages cast iron crank cases with scored bores

Scored or pinched bores used to mean the scrap pile for cast iron crank cases. But that's not so in service departments of Autocar Company branches since they installed a new salvage-by-welding technique. Here's how it's done —

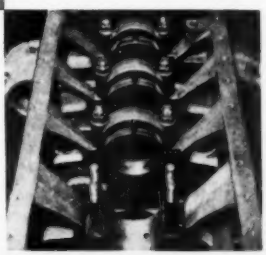


1 Welder deposits a layer of Ni-Rod "55" in center brace bore, while crank case bolted to block rests in upside-down position. This crank case bore hole had previously been machined down about .045" to remove scored area and eliminate oil-impregnated cast iron material. Fast work prevents store-up of excessive heat in cast iron brace.



2 Finished weld deposit has one-bead thickness. Using a ⅛" dia. Ni-Rod "55" electrode, the welder first deposited metal around the oil holes, then laid beads lengthwise in the bore, working from center outward and on alternating sides.

3 Now for the machining: The bearing cap is placed in a fixture. The joint surfaces are ground smooth and in parallel, then securely fastened in place. A special boring bar (bar held in perfect alignment with the other bores) and Carboloy-tipped cutting tool machine Ni-Rod "55" deposit down to the original dimensions. (Tolerance is held to 0.0005 in.)



4 As good as new. After machining, the bore's smooth new surface of weld metal is ready to receive the new bearing. Then the crank case is ready to be assembled. The first case salvaged this way has been in continuous service for over two years now, giving perfect service.

...you can save it with Ni-Rod®

There's one thing you know about increased defense production. As many broken or damaged castings as possible must be salvaged.

And with the proper techniques and equipment you can do just that.

With Ni-Rod and Ni-Rod "55", for example, you can make sound machinable welds in cast iron.

Welds that will restore equipment to essential production and at the same time save the cost of replacements.

And Ni-Rod is easy to use, too. Even a welder with limited experience can quickly learn to lay high-strength, sound, non-porous, machinable welds. Pre-heating or post-heating are seldom required.

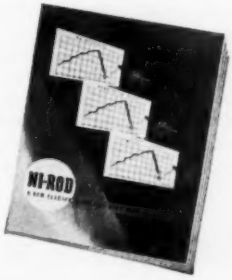
For information on how to use Ni-Rod and Ni-Rod "55" for machinable welds in cast iron, write for your free copy of "Ni-Rod, an electrode for any cast iron welding."

And remember, defense production requires a lot of Nickel and Nickel alloys. Therefore, it may take longer to get the Ni-Rod you want. But, you can help speed delivery of your order by including the D.O. or C.M.P. rating. Consult your distributor on present availabilities; he will be glad to keep you posted. And you can call on him for technical information too.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

EMBLEM OF SERVICE
INCO NICKEL ALLOYS

Write today for your free copy of "Ni-Rod, an electrode for any cast iron welding."



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Heavy-Duty CHAMPION

300-, 400- and 500-Amp. Production Welding Models. The extra years of service built into these machines make these models real welding champions.

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200-, 300- and 400-Amp. Production Welding Models featuring wide amperage range for adaptability to more jobs in any production welding shop.

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650-Amp. Model. For Automatic or Manual Operation, singly or in multiple set-ups. Offers unusual flexibility for your welding requirements.

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An all-purpose Utility welder with 25 to 180 Amp. range for repair-shop, maintenance and farm use, and featuring production welder construction.

Made by Welders . . . for Welders

Production proved by one of the world's largest users of welding products

Now A. O. Smith advanced design . . . new plus features . . . give you the latest in welding machine efficiency

D. C. WELDING MACHINES

The D. C. RECTIFIER

200-, 300-, and 400-Amp. heavy-duty Production Welding Models for all d.c. jobs. The *one* rectifier-type welder designed to eliminate stack failure!

The FIELD KING Gasoline-Engine

200- and 300-Amp. Models. The most advanced of all engine-driven welding machines! Built for rugged jobs in the field. Welds with new speed and ease.

Redesigned to match *today's* welding requirements, *A. O. Smith advanced design welders* offer you the advantages of improved construction, top welding performance, and more operating benefits. A. O. Smith welders put you in the best position to cope with today's requirements and costs. Whether your welding is manual or automatic, A. C. or D. C., A. O. Smith welders assure you of having the finest power source available anywhere.

Ask your A. O. Smith representative, your A. O. Smith distributor or write us, for full details about these advanced design welding machines. *They merit your study.* A. O. Smith Corporation, P. O. Box 584, Milwaukee 1, Wisconsin.

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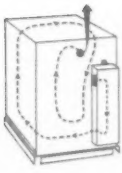
you need... **BLUEWELD**

Aridair

ELECTRODE
Moisture Content
STABILIZER

LOW HYDROGEN and STAINLESS STEEL ELECTRODE STABILIZER

Specifically designed and engineered to maintain correct moisture content.



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Cut cost of spot welding stainless steel . . . with MALLORY 100 METAL FLUTED ELECTRODES*

If you're spot welding stainless or other high strength steels—or any alloys having relatively high electrical resistance—you'll get more welds per dollar with fluted electrodes of Mallory 100 alloy. Outstanding features of these electrodes are:

1. **Fluted water cooling hole:** Provides 70% more heat transfer area for cooling water. An exclusive Mallory design now produced in Mallory 100 metal electrodes through new manufacturing techniques.
2. **High hardness and strength:** The higher hardness and strength of Mallory 100 metals coupled with excellent abrasion resistance and high annealing temperature, provide the ideal electrode for spot welding stainless steel, Inconel and other high-strength, heat-resisting alloys.
3. **Maximum electrode life:** Mallory 100 fluted electrodes produce the maximum number of welds of good strength, quality and consistency per dressing. By reason of the high strength and hardness of the electrode material and the most efficient design for cooling, the deformation of the welding face is held to a minimum.

Fluted electrodes of Mallory 100 are available in all standard shapes, and can be supplied in special forms to meet your individual requirements. For full details, call Mallory today, or contact your local distributor.

Behind every MALLORY Product . . .

. . . stand more than 25 years of metallurgical development and application experience in all types of resistance welding. This wealth of engineering knowledge is at your service, ready to work on your welding problems.

For low-cost, high-production welding, look to Mallory for electrodes, holders, dies, castings, forgings, rods and bars.

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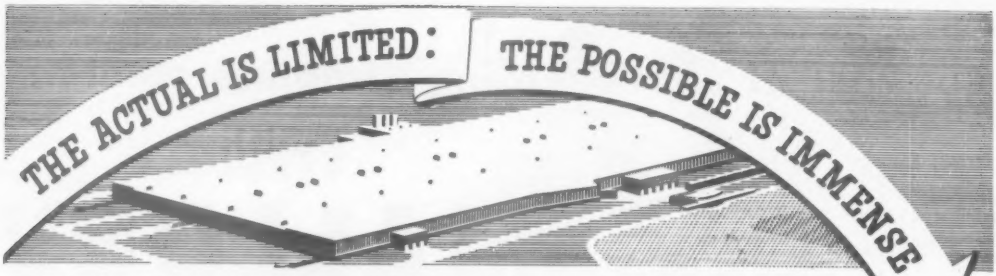
For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1952

WELDED DESIGN SAVES 25% ON COST

...cuts weight 26%

By **B. L. Kapp**, Plant Manager & Chief Engineer
Corson Brothers, Inc.
Indianapolis, Indiana

WELDED design enables us to make the most efficient use of materials in the manufacture of our "Seedmaster". Formerly it was necessary to use heavy wall sections with gray iron because of casting restrictions. With steel we now fabricate a more rigid, more dependable product using metals as light as 12 gauge. On this one machine, for example, weight was cut from 23 to 17 pounds. Since welded steel is easier to fabricate, our shop costs have been lowered by 25%. Former field service problems of breakage have been eliminated.

In addition to components shown in Figures 1 and 2, the main frame was also converted to welded steel. In place of a solid cast rectangular member, the main frame is now formed from 12 gauge steel with rolled edges for rigidity. The steel design is easier to assemble and has greater sales appeal.

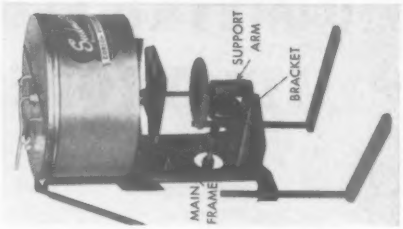


Fig. 4. Present Welded Steel Design. *Steel members replace cast components, prove to be lighter, but stronger in construction yet are formed from 12 gauge sheet.*

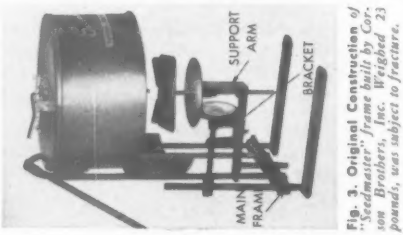


Fig. 3. Original Construction *of "Seedmaster" frame built by Corson Brothers, Inc. Weighed 23 pounds, was subject to fracture.*

PROPER DESIGN IN WELDED STEEL IMPROVES PRODUCT LOWERS COST

Fig. 1. Former Design *of bracket was gray iron . . . is now fabricated from 12 gauge steel. Steel design is rugged, durable, will not fracture.*

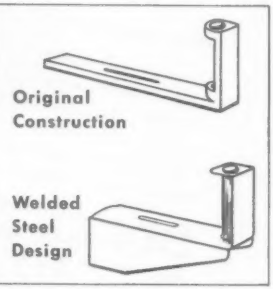


Fig. 2. Support Arm *originally a casting, required costly milling and drilling. Wall section was ½". Is now formed from 12 gauge material, has greater strength, increased rigidity, less weight.*

SAVES MATERIAL
LOWERS COST

Machine Design Sheets available on request. Designers and Engineers write on your letterhead to Dept. 711.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

ESTABLISHED 1916 THE WELDING ENGINEER NOVEMBER, 1952

What's Happened to America?

IF DEAD MEN turn over in their graves because of the actions of their descendants, then Washington and Jefferson are probably known in the afterworld as "Spinning George" and "Whirling Tom." Things today are certainly not as our founding fathers conceived them.

It would be impossible for men of the calibre of Washington and Jefferson to understand why we have so carelessly let slip away from us the rights for which they fought. To them, taxation without representation was tyranny—and sufficient cause to risk lives, families, fortunes and futures. Today exorbitant taxes are taken as a matter of course.

The motorist of today is compelled to pay a tax to park his car in the street that he and fellow citizens have already been taxed to build. However, he at least gets an hour's parking for the nickel he puts in the meter. For a large share of the taxes that he pays to our present federal government, he receives nothing but insincere oratory and lies.

Seduced by the siren screeches of "You never had it so good" and "Don't let 'em take it away," the modern breed of American seems content to stand spinelessly by while his hard-earned pay check is taxed from 25 to 35%. The billions collected are being squandered around the world to "bring freedom of speech and expression" (to people who have nothing to say), to feed the inhabitants of foreign lands (who continually blackmail us by threatening to go communist) and to pay for a useless war that is apparently going to go on forever.

Little did our forefathers dream that a President of the United States would be allowed to start a private war without the approval of Congress. Little would they have been able to imagine that Americans of the sixth decade of the twentieth century would be willing to part with their sons and their savings for a war that their leaders don't even want to win. Yet these things have come to pass.

WHAT has happened to the United States, anyway? Once we were a self-reliant people and stood on our own feet. Now we have to have government handouts. What has caused the youth of America to place security ahead of opportunity? Were the babies of the twentieth century born without guts?

If the Pilgrims had placed such inordinate values on old-age pensions and unemployment insurance, none of them would ever have embarked in the *Mayflower*. Thinking along lines of social security, the men of Washington's day would not have been Minute Men or created a Revolutionary Army. No pioneers would ever have moved from the settled Atlantic coast to the savage-haunted wilderness westward.

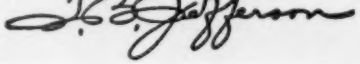
IF SECURITY had been man's driving force through the ages, civilization itself could not have come into existence. Always it has been the adventurer who has blazed the trail to progress . . . adventurers of the frontier such as Meriwether Lewis or John C. Fremont . . . adventurers of the mind such as the man who first experimented with a crude device for the burning of acetylene with oxygen. To him we owe oxyacetylene welding as it is today.

Some of these explorers and experimenters died young. Many of them had a worse tragedy: they lived to an impoverished old age, neglected and forgotten. But whether they were failures in their own times or successes, their lives made our country a better place to live. If they had not been allowed to dream and act, the world of today would be immeasurably poorer.

The truth is that socialism has never paid off except in the spreading of squalor and misery. Individualism has paid off in the discovery of fire and the wheel; in the printing press; in steam-driven ships and gasoline-powered autos and aircraft. Socialism has spread the poverty to a uniform drab level; individualism has meant a higher standard of living for everyone.

It is time that we kept faith with our founding fathers, time to resume our willingness to take on individual responsibility, to try new ways, to adventure into the unknown. To pit our courage against the future.

Our forefathers built a mighty nation. If we want anything like it to continue, we must get back to their blueprints.



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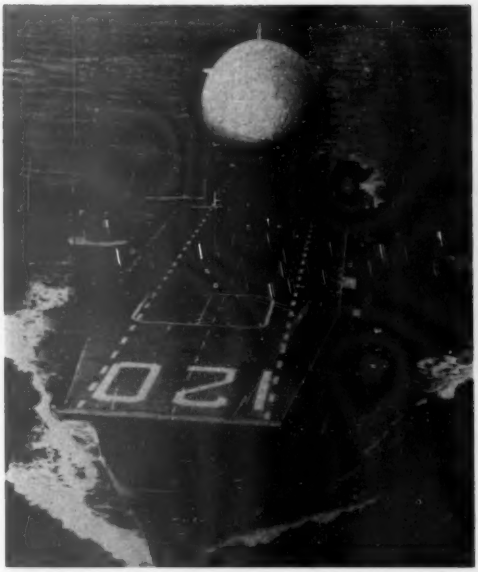
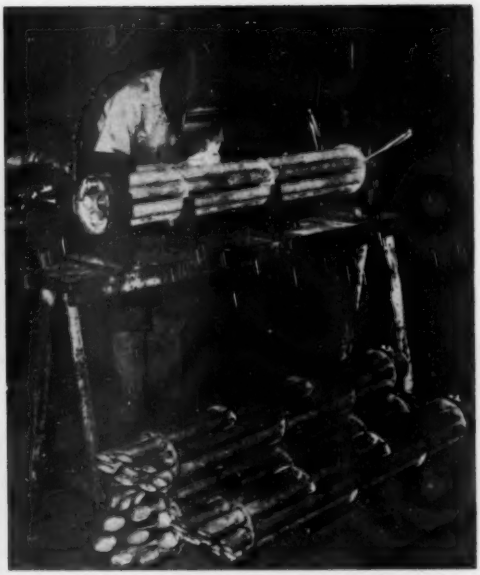


CAPABLE of flying around the clock, patrol blimps can land on carriers for fuel or refuel from tankers



EXHAUST heaters for the blimps are heat exchangers consisting of welded bundles of stainless-steel tubes

Cozy Cabins for Blimp Crews

BY RICHARD E. WHITE

Chief Project Engineer—Production, Ryan Aeronautical Co., San Diego

THE BACKBONE of the Navy's lighter-than-air arm, K-type blimps are an important member of the "hunter-killer" teams used to seek out and destroy enemy submarines. To provide cabin comforts for blimp crews engaged on antisub patrols, the Navy's ZP2K airships are being equipped with welded heaters.

These heaters are actually lightweight heat exchangers that are attached to the blimp engines. Each heater is a circular cluster of eight stainless-steel tubes contained within a tubular shroud. As the hot exhaust gases pass through the tubes, the air within the shroud is heated. The warmed air is channeled through two floor vents to the cabin to keep the crew comfortable on extended flights. There is no extra cost for heating, no extra weight of fuel. Like your car heater, the system harnesses exhaust heat energy that would otherwise be entirely wasted.

The tubes from which the heat exchangers are made are approximately 52 in. long, 1⅞ in. in diameter and have a wall thickness of 0.035 in. The material is type 321 stainless steel. The baffles (plates) are cut from sheet stock of the same material 0.049 in. thick.

Assembly and Tacking

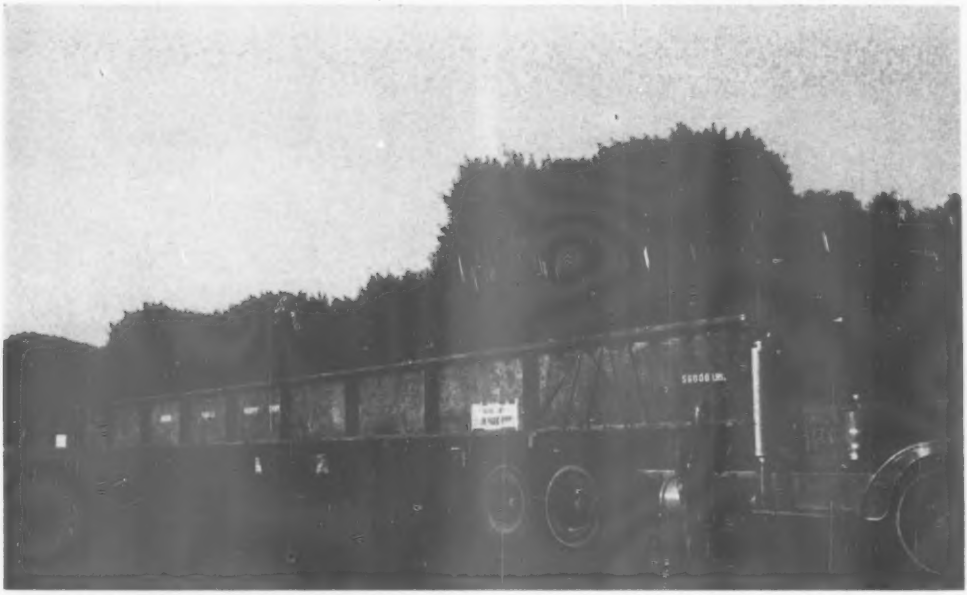
The tubes and baffles are assembled in special jigs constructed of welded channels and piping. The baffles and end plates are precisely located, and all tubes are tack welded into place. The tacking is done by manual metal-arc welding, using 5/64-in. coated electrodes of type 321 stainless. Current is 60 amp and voltage 50 volts. Welding speed is relatively slow—around 4 ipm—because of the difficult configuration of the work and the inaccessibility of the tubes when clustered.

After the parts have been spot tacked together, they are removed from the jig and transferred to a curtained booth for finish welding. The assembly is metal-arc welded around each tube at the location of the end plates. This is accomplished in a standard Ryan clamping fixture. Care is exercised to see that all joints are gastight so that no exhaust leakage can occur when heater is in service.

Despite an enviable war record of escorting 89,000 ships without a loss, many persons believed that blimps had passed their peak of usefulness and would be permanently relegated to mothball obscurity. However, recent developments in sonar and electronic methods of detecting submarines have given the lighter-than-air craft a new place in the arsenal of naval weapons.

Hunter and Killer

In the antisub team of surface vessels, planes and Goodyear blimps, the blimp role is usually that of the "hunter" because of its ability to carry a great deal of electronic detection gear. Also, its air endurance and maneuverability make it a hovering eye of sharp perception. Besides being a hunter, however, the blimp can also become a deadly "killer" when occasion demands by bringing into play its machine guns, depth charges and other weapons.



FAR EXCEEDING the largest dimensions obtainable for a rolled beam, this giant I-beam has a weight of 28 tons

These Fillet Welds

If you want to know how to do a job of heavy welding, you'll find useful pointers here. Flanges of this giant I-beam were 3 in. thick, dwarfing the 7/8-in. web.

BY RALPH H. KIPP
Assistant Steel Inspector, Materials and Research Dept., Calif. Div. of Highways

ONE of the largest all-welded steel beams ever manufactured was recently placed in service at a grade separation structure near Oakland, Calif. This big beam is 53 in. deep and 106 ft long. It had to be constructed as a weldment because the largest standard rolled beam is 36 in. deep (considerably short of the designed 53 in.) and does not have the required strength.

The beam was put together in the yard of the Judson-Pacific-Murphy Corp., Oakland Structural steel plates were used as the fabricating material. The top and bottom flange plates are 3 in. thick, and the web plate is 7/8 in. thick. A cross-section through the beam is shown in Fig. 1.

Both flange and web plates had to be assembled in several sections. The flanges were made in three parts each. The top flanges were made of three sections of 16-in. wide plate: 23, 37 and 46 ft long. The bottom flanges were made of three sections of 20-in. wide plate: 26, 37 and 45 ft long. Each flange thus required two butt welds.

Edges of the 3-in. flange plates were flame-cut to 30-deg angles (60-deg included angle), leaving a small land. This double-vee edge preparation is depicted in Fig. 2. The flame-cut surfaces were also ground smooth. The welds were made with semiautomatic equipment, using 5/64-in. wire, 420 amp and 30 volts.

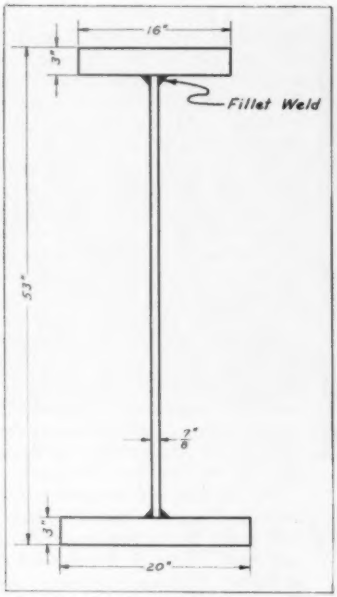
In order to have sound welds without craters for the full width of the plate, welding was started and stopped on auxiliary material outside the edges of the flange. Small structural steel angles were tack welded to the flange-plate edges to provide metal for starting and stopping the arc. These extensions were removed by flame-cutting when the welding had been completed, and the plate edges were ground smooth.

PREHEATED 300 F

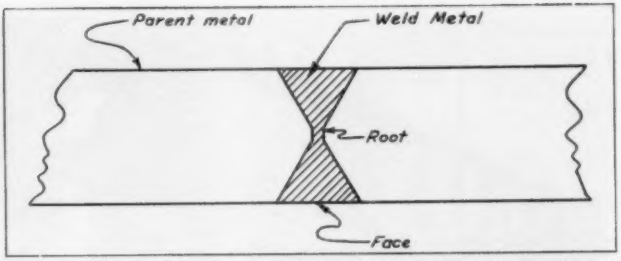
In welding material of this great thickness, preheating is a must to avoid the chilling effect of the large mass of metal. The plates were preheated to a minimum temperature of 300 F and kept up to that temperature during welding. Two gasoline torches and one large kerosene torch were used for preheating.

To weld each side of a flange plate took approximately 2½ hours and required an average of 14 passes. Upon finishing the welding of a side, the flange was turned over and the vees in the second side chipped down to clean metal before starting to weld.

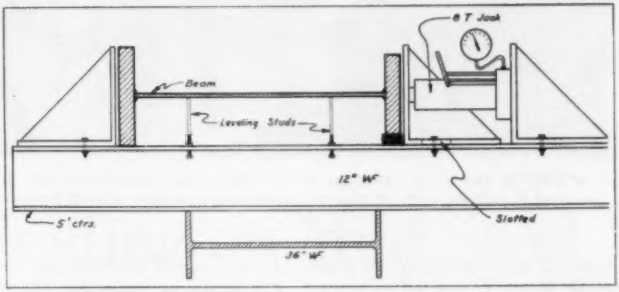
The web plate required only one butt weld as it was fabricated from two 48 by 7/8-in. sections: one section 37 ft long and one 70 ft long. These plates were beveled to 30 deg and welded with a submerged-arc



1—CROSS-SECTION through the beam



2—DOUBLE-VEE edge preparation for the butt welds of flange plates



3—SUPPORTING skid functioned as a huge vise to hold beam alignment

Were 106 Ft Long

automatic welding machine of 800 amp, 30 volts, using 3/16-in. wire. Before starting the automatic weld, a small "sealer" pass was welded in by manual arc.

In spite of the preheating, the straightening of the plates, both before and after welding, was one of the major problems. Steel plates are invariably warped or distorted by heating of local areas, and this was especially true of the 3-in. flange plates. Straightening had to be done before and after each finished weld. Finally, the completed flanges and web had to be straightened again before final assembly. Straightening was accomplished by means of a combination of heat and pressure.

Building the Beam

Final assembly of the three long welded plates into an I-beam structure was done on a "skid" or supporting framework (Fig. 3). Especially constructed for this job, this skid was built upon a foundation of 36-in. beams, which were placed flat and end to end for the entire length. On the top sides of the 36-in. beams, 12-in. wide-flange, heavy-section beams were placed transversely. The transverse beams were evenly spaced on 5 ft centers along the entire length. This assembly of beams was leveled, straightened and then welded to provide a rigid framework.

The next step was to bolt uprights (the triangles in Fig. 3) to the 12-in. transverse members. The uprights along one side were bolted solidly in place, while those on the opposite side were movable. Between the stationary and movable uprights, space was left for the 53-in. width of the beam.

The entire assembly functioned as a huge vise, purpose of which was to apply pressure to the beam as a whole in order to bring the web into proper contact with the faces of the flange plates. The pressure was applied by eight-ton hydraulic jacks, which made contact with one flange through the slotted uprights.

Before final fitting-up was started, the 48-in. web plate was trimmed to a width of 47 in. and the areas where it would contact each flange were cleaned by grinding. The fitters started at the center of the beam and worked simultaneously toward each end. One movable vise was needed on top in order to correct lateral variations in the beam. It had at first been believed that five-ton jacks would be adequate for this purpose. However, it was found necessary to use eight-ton equipment in order to bring the 3-in. flanges into the desired contact.

Beam at 35-Deg Angle

In order to secure equal penetration of the web and flange during the welding, the beam was placed at an angle of 35 deg with the horizontal. This slope was not enough to affect the control of the welding machine.

The preliminary line-up was fixed by tack welding the web to the flanges. The tack welds were slightly longer than those made under more ordinary fabricating conditions. The longer tacks were used for two reasons: (1) to hold the members squarely in contact and (2) to provide a better base for the automatic welding machine. The welding head

ANOTHER view of the giant beam en route to the construction site. It is used to hold the ends of stringers supporting a roadway slab of freeway

traveled, of course, along the length of the beam, in a direction perpendicular to the plane of the paper in Fig. 3. Four 106-ft fillet welds had to be made, one on each side of the web plate at top and at bottom.

Before starting the fillets, the surfaces to be welded were cleaned with power-driven brushes. All interfering tack welds had to be chipped out and replaced. This cleaning operation was naturally expensive, but it had to be done thoroughly in order to secure the proper penetration and to limit surface defects.

As in the case of the butt welds in the flange plates, the work was preheated to 300 F minimum. This temperature was maintained in advance of the welding head by a large kerosene torch and four gas torches. The temperature was controlled by 300-deg temperature-indicating crayons and was checked from time to time with a portable pyrometer.

A ¼-in. welding wire was used, with a current of 1,015-1,100 amp and a voltage of 27-30 volts. It took the welding machine four hours to travel the 106 ft in one fillet weld. For each 106 ft of ½-in. fillet, about 75 lb of welding wire were consumed.

The welds were started and stopped outside the beam itself by means of end platforms. The beam was supported on the skid during the entire welding operation. During each heating and welding sequence, a camber of about 2½ in. was produced in the 106-ft length of the beam. The average lengthwise expansion following each weld operation amounted to about ⅛ in. in the overall length of the beam. Upon the completion of welding and cooling, however, the beam came within all tolerances required of a rolled section. It also returned to its original straightness, losing the camber resulting from the heat.

Postweld cooling was inhibited by augmenting the insulating qualities of the slag with 6-in. strips of asbestos board. Cooling required from eight to ten hours. Temperature readings, taken at a distance of 6 in. from the weld, showed:

At 1 hour after welding—
flange 210 F, web 180 F
At 2½ hours after welding—
flange 148 F, web 128 F
At 4 hours after welding—
flange 128 F, web 98 F

Gamma-Ray Inspection

Visual inspection of the welding was performed by the writer, who was present during all welding operations. In addition, gammagraphs were made of all of the butt welds and of a reasonable portion of the fillet welds. This work was performed by the Pittsburgh Testing Laboratory. It may be of interest to note that the 100-gram radium capsule they used is valued at around $50,000.

To conduct a gamma-ray inspection of a butt weld, the flange plate was raised 3 ft from the floor. The radium pellet was then hung between the floor and the plate, about 24 in. from the weld. The films were placed over the weld and exposed about eight hours for the 3 in. material.

The exposures for the fillet welds were made by placing the films on the outside face of the flange, the beam being in an upright position. The radium capsule was located at an angle of 20 deg from the web and about 24 in. from the weld.

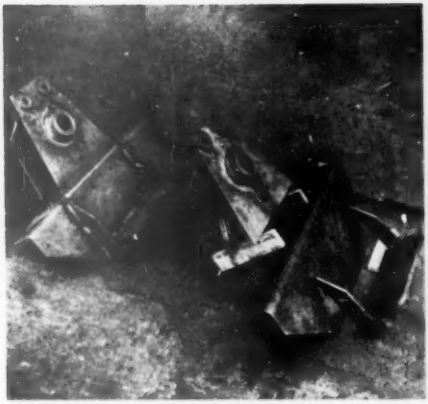
The reason why such a beam was needed may interest some readers. The beam is part of the separation structure on the Eastshore Freeway, which is located about a quarter of a mile northwest of San Lorenzo (near Oakland) at the junction of Route 228 with the Eastshore Freeway.

The location and controlling features at this grade separation structure sound like a bridge designer's nightmare. There is a combination of limited headroom, high skew and the structure is on a curve. The Bridge Department of the Dvision of Highways, which has the responsibility for structural design, found the most economical solution to be the use of solid-wall abutments of reinforced-concrete, built along the curve and skew of Route 228. To support the roadway slab of the freeway, steel stringers were placed perpendicular to the abutments. This necessitated facia beams to support the stringers along the sides of the upper roadway. Each beam supports one end of the stringers.

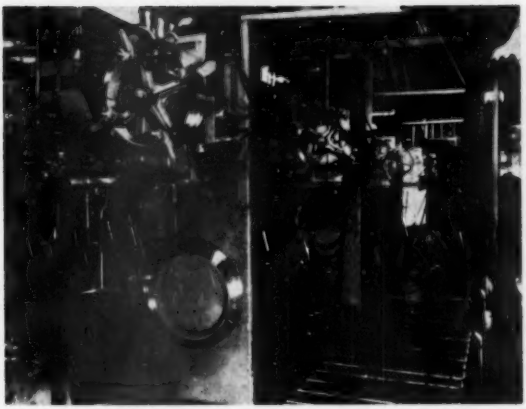
Because of the combination skew and curve, these two beams are of uneven length. The span of the south edge member is 100 ft, that of the north edge but 65 ft. The south-edge beam is the 106-ft beam whose construction we have just described. It is not only heavier than the north-edge beam but also takes advantage of composite action with the concrete curb by the use of shear lugs along its top flange.

* * *

The beam was manufactured for the contractor, Fredrickson and Watson Construction Co., by Judson-Pacific-Murphy Corp., of Oakland. Fabrication inspection was performed by the writer. The resident engineer of the California Division of Highways is J. N. Perry, of the Bridge Department.



1—ALL-WELDED spring suspension bracket. At left, finished bracket; right, the components



2—EIGHT BOOTHS are needed to weld spring suspension brackets. Conveyor at right carries off the finished parts

More I-G* Welding on Mild Steel

*I-G is an abbreviation just coined for inert-gas welding. With new automatic equipment, the inert-gas metal-arc process is successfully applied to mild steel.

IN THE August, 1952, issue, THE WELDING ENGINEER described the application of inert-gas shielding to the welding of mild steel in a west coast aircraft plant. Now we find the General Motors Corporation Truck and Coach Division, Pontiac, Mich., using the same process in the fabrication of two subassemblies for the Army's M-135 trucks.

SPRING SUSPENSION BRACKET

One of these assemblies is the all-welded part shown in Fig. 1. This spring suspension bracket is fabricated from ⅜-in. plate. The completely fabricated bracket is pictured on the left of Fig. 1, while the "exploded view" on the right shows the manner in which the subassemblies are welded prior to final assembly.

Twelve pieces of steel, machined, sheared or flame-cut to size and proper shape, are joined together to make the suspension bracket. Metal-arc welding is done in the assembly of some of the smaller parts. Nevertheless, the shielded inert-gas metal-arc welding total for the fabrication of a bracket amounts to 108 inches.

The bracket is welded in a fixture that makes it possible to do all the welding in the downhand position. A mild-steel wire 1/16 in. in diameter is used. Welding is done with d-c straight polarity at 425 amp. The shielding gas is argon, which flows onto the work at a rate of 35 cu ft per hour.

Like so many automobile plant operations, the welding of these spring suspension brackets is on an assembly-line basis. Figure 2 shows four of the eight welding booths that are needed for this one fabrication. In the right foreground of the picture is the conveyor that carries finished parts from the welding booth. Between the rows of booths is another conveyor that brings the component parts to the welding booths for fabrication.

BUMPER AND BODY BRACKET

Another subassembly of the M-135 truck is the secondary spring bumper and body bracket, Fig. 3. Five plates make up the subassembly. The bumper plate is ⅜ in. thick; the saddle and bracket plates ¼ in. thick, and the body bracket clip ½ in. thick. In the center the plates are tack welded, and at the right we see the finished job.

There are 43 in. of inert-gas metal-arc welding on this subassembly. All the welding is done with d-c straight polarity at 360 amp. The welding speed is roughly 35 ipm, and the argon flow is around 30 cu ft per hour.

Photos courtesy Linde Air Products Co.

3—SECONDARY spring bumper and body bracket. Left: component parts in position for tack welding. Center: tack welded. Right: finished assembly

SAVED: 341 Tons of

This month's installment describes the erection procedure, including field welding, that was used for a Veteran's Hospital building in Minneapolis.

BY COL. R. A. PHELPS

Welding will produce a better structure than either riveting or bolting, at a substantial saving in cost, and give other benefits as an added bonus. This was proved beyond a doubt in a recent building for the Veterans' Administration Hospital in Minneapolis.

The general construction contract for this ten-story tier-type building was awarded to the J. D. Hedin Construction Co., Washington, D. C. Subcontract for the fabrication and erection of the steel went to the American Bridge Co. The firm of Saylor and Greeves, Inc., Detroit, redesigned the building for a welded framework —original design by the V.A. Construction Service had been for a fully riveted structural steel framework. Inasmuch as Saxe erection clips and seats were used to secure the steel in place prior to welding, Van Rensselaer P. Saxe, of Baltimore, was retained as a consultant.

In the September issue, Col. Phelps told how the steel was shop fabricated prior to welding and gave tables (reproduced on page 33) proving that welding effected a total saving in steel of 341.0 tons. Next month he will present a detailed cost sheet of welded construction and compare it with riveting costs for structural steel construction.—The Editors.

ALL THE steel at the Veterans' Administration Hospital was erected by a truck-mounted crane having a 100-ft boom with a 35-ft jib. This self-propelled portable crane moved about the perimeter of the building. To provide clearance for the boom to reach all parts of the ten-story building, it was necessary to omit the lower floor beams in one bay. The use of this crane saved double handling of steel on the site. With the usual stiff-legged derrick located on the steel framework, it is necessary to double handle much of the steel and the position of the derrick must be frequently changed.

Steel that is omitted in bays on the lower floors (to permit boom clearance to erect higher floors) should be put in place as the erection proceeds. After the lower tiers have been welded, these beams can then be removed to provide the necessary clearance. If the beams are omitted before the lower tiers are welded, the entire framework will pull away from the open bays. Moreover, the floor beams will be found to be too short when they are later fitted. To hold the correct spacing, the beams must be in place when the balance of the lower floors are welded, even though they will have to be removed later. The same procedure will not be required on the higher floors as little or no movement of the steel will occur after it is firmly tied together at the bottom.

Since the erection crew had had no prior experience with the Saxe clip, considerable time was lost through the trial-and-error method. Before the first tier was fully erected, however, a satisfactory procedure had been worked out. Columns in the first tier were placed over the anchor bolts, and the nuts were run down hand tight. A two-man team then set the first-floor beams of the tier. One man lined the beam clips with the seat on the fixed column end, and the second man lined the beam clips with seats on the free column. When all clips were in line with their seats, they were driven home. This was done by striking each end of the beam simultaneously with a heavy sledge. A typical floor beam assembly is pictured in Fig. 1.

Although there was a tolerance of only 1/16-in. in the length of the beam, little trouble was experienced in setting the first-floor beams. With the anchor bolts in true alignment, the only adjustment needed was due to overthickness of the column flanges. This overrun in the column flanges was caused by the wearing of the steel-mill rolls that form the columns. When it occurred, it could be overcome by moving the column in the anchor bolt slots.

More difficulty was experienced with the second-floor beams as the tops of the columns were often sprung

1—FLOOR BEAMS membered into column flanges. This typical assembly shows how the clips on the beams are aligned with the seats on the columns

Steel—II

out sufficiently to prevent the beam clip from entering the seat. When this occurred, a sling was placed around each of the two columns. These slings were hooked to the crane line. By raising the line, the columns could be pulled together until the clips would engage the seats.

An adjustable clip is now on the market, which allows a ¼-in. adjustment. Use of this adjustable clip on each end of these second-floor beams in each tier would have provided a ½-in. adjustment, sufficient to have overcome most of the trouble.

When the steel for the first tier was in place, plumbing was started. It was found that the tightly fitting clips held the steel in practically true alignment. Very little movement was required to plumb the structure. Only sufficient guy braces were installed to wind brace the assembly. As soon as the tier was plumbed, the welding work was started.

Table I

Saving in Steel Auxiliaries

Weight of auxiliary steel in riveted job	180.0		tons
Weight of rivets	75.0		tons
Weight of Saxe clips		10.0	tons
Weight of welding electrodes		11.0	tons
Totals	255.0	21.0	tons
Saving		234.0	tons

Saving in Steel by Continuity Design

Weight of riveted steel beams	1,265.0		tons
Weight of welded steel beams		1,153.0	tons
Weight of stiffeners for continuity		5.0	tons
Totals	1,265.0	1,158.0	tons
Saving		107.0	tons
Total saving		341.0	tons

Table II. Savings in Shipping, Unloading and Sorting

Weight of steel for riveted job (less rivets)	2,242	tons
Weight of steel for welded job (less welding rod)	1,968	tons
Saving in weight of steel handled	274	tons

Welders vs Riveters

Although there were no experienced structural steel welders available, the job never suffered from lack of competent men. The welders who reported had received their training in metal shops, shipyards, mines, railroads and garages. Many of them had been trained in war plants and shipyards; some had attended welding schools.

Since welders are needed in practically every type of industry, they can be assured of year-around employment in or near all manufacturing centers. This opportunity appeals to a large class of home-owning workers, such as are found in the Twin Cities.

Riveting, on the other hand, is fast disappearing in all types of manufacturing. The opportunity for year-around employment as a riveter is very limited. The only source of supply is the rapidly diminishing group of nomad riveters, who are forced to travel nationwide to secure a livable amount of employment. It would be extremely difficult to recruit a sizable crew of riveters in the north central states in the winter.

Obviously, not all of the welders who reported had sufficient knowledge and skill to do structural steel welding. Each applicant was given the qualification prescribed by Part II D204 of the Standard Code for Arc and Gas Welding in Building Construction, prepared by the American Welding Society. These tests were conducted by the Twin City Testing and Engineering Laboratory, of St. Paul. The same company performed all of the welding inspections. One of its representatives was on the job whenever welding was in progress, and the conscientious efforts of these inspectors contributed greatly to the success of the project.

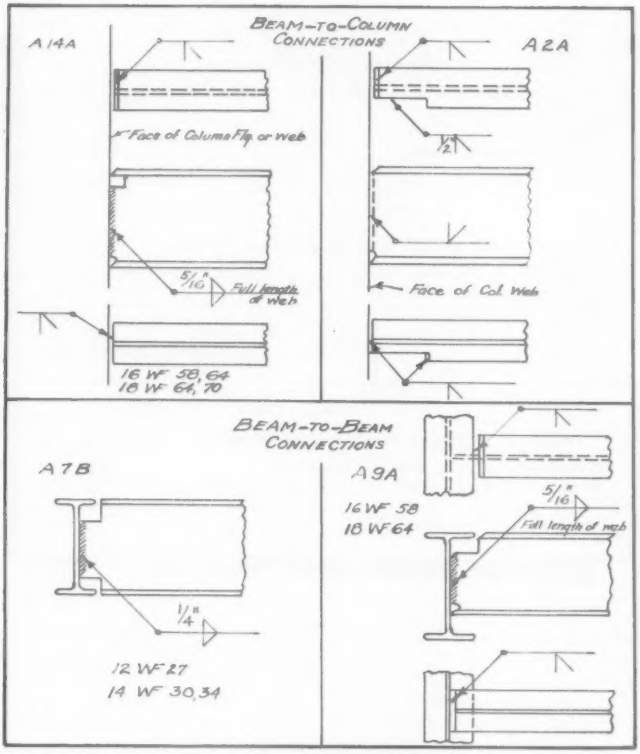
After an applicant had undergone his preliminary test, the inspector watched his work until confident that it would be satisfactory. About 75% of the applicants were found to be capable. The crew was increased in this cautious manner until a maximum of twenty welders were at work. New men had to be processed throughout the entire period as a large number of those who were found to be satisfactory worked but a short time. They either would not or could not endure the physical hardship and danger of outdoor winter welding.

The specifications would not allow steel erection to proceed more than two floors ahead of the welding. It was necessary, therefore, to start the welding as soon as the first tier had been erected and plumbed. No approved details or schedules were then available for the welding. To get the work underway, the welds were applied in accordance with commercial standard practice as shown in the Saxe manual. For simple beam-to-column welds, this standard requires welds on flanges and on about two-thirds of the web. When the approved details were received, they called for heavier welds and for the entire length of the web to be welded. This made it necessary to rework all of the connections previously welded, which added materially to the cost.

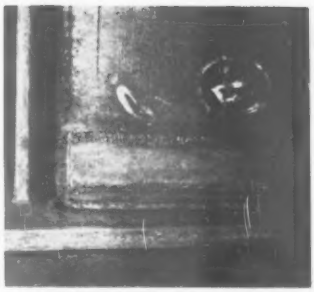
The approved drawings consisted of a complete schedule listing each beam by number and giving the symbol number for the weld to be applied at each end. These symbols referred to a set of drawings detailing the type of connection with the location and size of each weld. Samples of connection details are given in Fig. 2.

Inspection of Welding

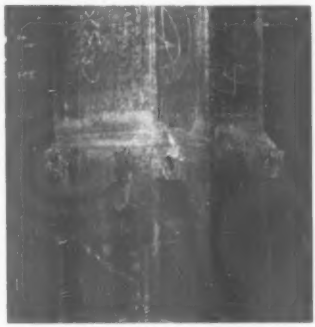
Before welding started, the inspector examined each connection to be welded. He checked the clearances between members, determined that members were fully seated to assure true alignment and grade and saw



2—TYPICAL welds made for beam-to-column and beam-to-beam connections



3—FILLER angles were employed where space between the beam and column was in excess of ⅛ inch



4—WELDED column splice. Ears used for temporary bolting of sections will be sliced off by torch

that all surfaces were clean and clear of obstructions. He was particularly careful to see that bevels were made on flanges and webs where required. He then marked the connection with the symbol indicating the type of weld to be applied. He also indicated the greater size of weld required where the clearance between members was greater than 1/16 in. but less than ⅛ in. If the clearance was greater than ⅛ in., he indicated that a filler angle should be installed. Such a filler angle in place is shown in Fig. 3.

Frequent inspections during the welding operations were made to determine the aptitude of weldors and to improve the technique. During cold weather, the inspector also had to check the preheating of the base metal and to watch constantly for any indications of weld cracking.

Completed welds were measured and gaged for size and visually checked for indications of lack of fusion, slag inclusions and undercutting. All welds found to be correct as to location, dimensions and quality were marked with a special symbol. Welds in which corrections were to be made were also marked on the steel. A record was made each day of all completed welds and the corrections.

A second trip was made over the area to complete the corrections. These were reinspected, marked, corrected, reinspected, etc. until all welds were marked as satisfactory.

Welding Sequence

Although quite irregular in exterior contour, this building is practically square in extreme dimensions. It has 21 column lines running north and south and 22 column lines running east and west. The north-south column lines were lettered from A to U and the east-west lines were numbered from 1 to 22. The elevator shafts, which occupy the north center of the area, are bounded by column lines S, L, 6 and 11. As the tolerance for elevator shafts is 1 in. in 1,000 in., plumbing was started at the shaft columns, followed by welding. Bays adjacent to the shaft were then plumbed and welded.

With this core plumbed and welded, the first procedure tried was to weld along the column lines from the core toward the exterior of the building. This was unsatisfactory. Although the steel was plumb before welding was started, when the outer edge of the building was reached it was found that an accumulated error of from ½ to ⅝ in. had pulled the outer columns inward because of the "draw" natural to welding operations. Some other welding sequence had to be employed.

The successful method that was finally adopted was as follows:

The elevator shafts were welded first, same as before. Then the welding on each column line was started at the exterior of the building. Welding progressed inwardly toward the shaft. This method held plumbing tolerance within ⅛ in. for the eleven floors.

Part of the reduction in "draw" was due to the welding procedure used on each beam-to-column connection. The first welding pass was made in the flat position at one end of the beam. The next weld, also a down pass, was placed on the opposite side at the other end of the beam. This tacked the beam at both ends, preventing it from pulling away from the column. The overlay passes were then completed at one end of the beam at a time. This skip welding causes considerable extra movement. It could have been eliminated if sufficient weldors had been used to weld both ends of a beam concurrently.

The steel structure was fabricated in five tiers of two stories each. The column sections extend two feet above the second floor of each tier. These column sections had ears welded on each of the four corners (Fig. 4). The ears were temporarily bolted together during erection—the only construction bolts used on the entire job. After the column sections had been welded, the ears were burned off.

It Took 20 Welders

Originally, 14 motor-driven welding generators were installed. These were supplied by a temporary feeder from the power company's lines. Each d-c generator served one welding electrode through approximately 500 feet of heavily insulated cable. Later on, six additional engine-driven generators were added. The gasoline-powered sets caused considerable trouble during extremely cold weather. The motor-driven sets were far more satisfactory in this respect as they operated continuously throughout all kinds of weather with a minimum of trouble. One operating engineer serviced all generators.

When the weather was mild, the weldor rode the steel on beams 12 in. or less in depth. For deeper beams and when cold weather made preheating necessary, a rivet float was used. These floats, about 4 by 5 ft in size, were made of heavy timbers. They were suspended from the steel by ropes and were very heavy and cumbersome to move. A lightweight platform hung from beam clamps would have saved time and labor.

When the temperature of the base steel was below 32 F but above zero F, welding was permitted only after the steel had been preheated. No welding at all was permitted when the temperature dropped to zero or below.

The first preheating was done by means of a multiflame oxyacetylene torch. These torches were fed by two long rubber hoses attached to acetylene and oxygen tanks located at ground level. Both hoses and torches were expensive and easily damaged. Only two weldors could be served by one torch, and extra help was required to assist them in moving between welding locations. A crew of 20 weldors would have required 8 to 10 torches, more than a thousand feet of hose, 4 to 5 cylinders of acetylene per day and 5 to 6 cylinders of oxygen. This cost would have been very heavy.

Carbon-Arc Preheating

An ingenious employee of the American Bridge Co. substituted an arc heater for the preheating torch. He devised an auxiliary attachment to convert a standard welding electrode holder into a twin-carbon arc torch. This attachment (Fig. 5) was fastened to the electrode holder by a hinged clamp secured by a pin.

At the forward end of the attachment was a clamp holding a fixed carbon. An insulated wire cable about 6 ft long was attached to the carbon clamp. A ground clamp was attached to the other end of this cable.

When using the arc heater, the weldor attached the ground clamp to a steel beam an arm's length away from the float. He would place a small piece of carbon in the electrode holder, bring the two carbons together and then separate them to set up an arc. This arc heated the base steel in the location to be welded in about one minute.

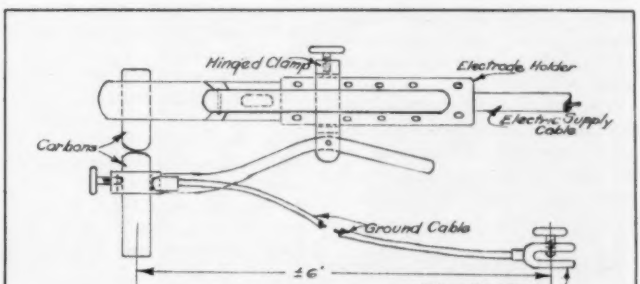
When sufficient heat had been applied, the weldor pulled the pin that unclamped the attachment. He allowed the attachment to fall away from the float, but as it was suspended by the ground cable it remained within easy reach. He then dropped out the small piece of carbon from the electrode clamp and inserted a regular welding rod. These attachments were made on the job at a cost of but a few dollars, and the only operating expenses were electricity and carbon electrodes. The simple device saved thousands of dollars in preheating.

Arc preheating was used throughout the job except at the column splices. Here gas heating had to be used as the heavy masses of steel required great quantities of heat.

Each weldor was furnished with standard gages to measure the size of the weld. These served a dual purpose: (1) to insure that a sufficient amount of weld metal was deposited at each connection and (2) to save rod from being wasted in excessive welding.

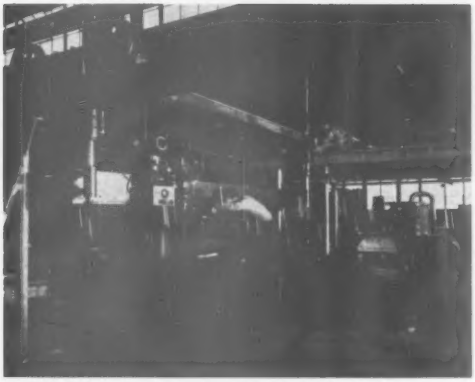
Humidity will cause cracking of the flux on welding electrodes during all seasons of the year. To prevent this, a drying cabinet was constructed of lumber with a waterproof paper lining. This cabinet held about 600 lb of electrodes. The drying heat was provided by two 75-watt electric bulbs. Rods returned at the end of the day were dried before reissue.

Next Month: Col. Phelps' third and final installment will give more details on welding vs. the weather. Welding costs will also be compared with riveting costs.



5—HOW a standard-make electrode holder was converted into a carbon-arc preheater. Preheating was done when thermometer was between 0 and 32 F

Shovel booms . . .



1—BOOM assembled for submerged-arc welding. Head is mounted so that it can be moved in six directions

2—HOW PART looks after two passes. Picture gives good view of long fillet welds to be made along edges

Better and Faster Welding

Set-up at Tractomotive Corp., Deerfield, Ill., offers improved submerged-arc welding for either a special job or repetitive production operations.

About four miles west of Chicago's exclusive North Shore suburban area is the little community of Deerfield. Here, on a site that was a corn field only a few years ago, will be found the modern fabricating shop of the Tractomotive Corp.

Tractomotive specializes in the production of front end shovels for industrial tractors and other earth-moving equipment. It has an elastic set-up that permits automatic welding on a variety of components for crawler-type tractors, including hydraulic shovel booms, pipe-laying booms, mold boards, hydraulic cylinders and piston rods.

The company owns two series-control submerged-arc welding heads: one mounted on a 15-ft side beam and the other on a boom that can be raised and lowered or swung in a horizontal plane.

Movement in Three Dimensions

As will be seen from Fig. 1 and our front cover illustration, the welding head on the side beam is part of an elaborate set-up. The 15-ft side beam is suspended over hydraulic cylinders that impart a vertical motion, permitting the head to be positioned anywhere from floor level to 8 ft above the floor. At the 8-ft level, two carriages or trucks run on rails 30 ft long. The welding unit is moved manually on these two carriages. On two rounds inside each carriage rail, there are mounted adjustable stops, which are very useful for positioning the welding head for repetitive welds made horizontally and across. Finally, the head can be swung out 90 deg to permit welding to be done parallel to the main rails that carry the entire side beam.

There are thus six directions in which welding can be done. This flexible set-up is expected to be used for many items in the future, both on cylindrical and on straight welds. An example of the latter is the welding that is done on a boom for a hydraulic shovel, Figs. 1 and 2. Over 7,000 such booms have been built at Tractomotive.

This part is 10 ft 3 in. long and is constructed of four 1-in. plates welded together to form a box section. Fillet welds of the corner variety are made along each of the four edges.

The boom is temporarily assembled on horses, and the plates are tack welded. A shelf to hold the granular welding flux is also tack welded ½ in. below each edge just before it is welded. When the flux shelf is in place, a small bead is laid by manual arc welding for the entire length of the bottom. This initial root pass is made manually because with 1-in. plates it is difficult to secure the tight fit-up necessary for automatic welding.

Our cover illustration shows the weld in progress.

Figure 2 pictures the shovel boom after the completion of two passes. One pass is made at a time on each side of the boom until three passes have been made on each side.

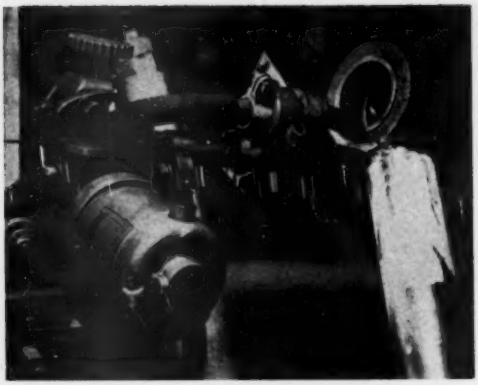
Hydraulic Piston Rods

Figures 3, 4, 5 and 6 depict steps in the fit-up and welding of the hydraulic piston rods that are used on the tractor shovel. Ordinarily, this part would be forged on the end of 3-in. bar stock and then machined—a slow and costly method. Instead, Tractomotive uses a steel casting for the connecting eye, while the rod itself is machined from 2½-in. bar stock, turned, ground and polished. By welding the two parts together, a considerable saving in production cost has been effected.

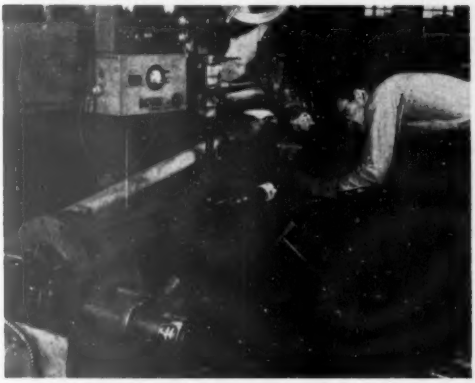
(Continued on page 52)

Piston rods . . .

3—CONNECTING end of hydraulic piston rod (left) has a groove machined to receive machined cut on rod



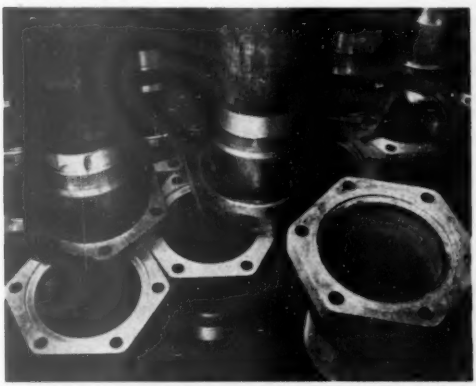
4—TACK welded in four places, the piston rod assembly is ready for automatic submerged-arc welding



5—WELDING head can be swung in an arc above work. Turning fixture rotates work under the automatic head

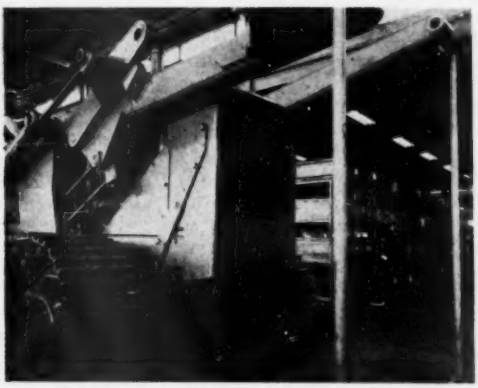
6—OPERATOR uses a cut piece of a rubber hose to hold flux in place on this small-diameter workpiece

Cylinders . . .



7—WELDS made to join the bolt-ring flanges to hydraulic cylinders. Upper cylinders show outside welds

Parts Assembled . . .



8—SHOVEL boom, piston rods and hydraulic cylinders as they look assembled on a crawler-type tractor

1—LETTERS indicate the important components of improved flux reclaimer. A is hammer mill, B dust collector, C magnetic pulley that extracts iron particles and D furnace for drying out flux as it goes down the chute

How We Cured Porosity

Surface porosity was causing lots of trouble in weldments fabricated by the semiautomatic submerged-arc process. The cause of porosity was threefold.

DON W. WHITESIDE
Welding Methods Engineer,
R. G. LeTourneau, Inc.

OUR welding processes at the LeTourneau plant at Longview, Tex., have changed during the last three years from 100% manual arc welding to about half manual arc and half semiautomatic submerged-arc welding, or "squirt" welding, as we have learned to call it. During the course of changing from one process to the other, we were confronted with the problem of surface porosity. This had to be licked before we could gain any real production benefit.

It proved a long and tedious search to trace the elements responsible for surface porosity. At times, the cause seemed to be eliminated, but the porosity continued for no apparent reason. It seemed to us that each separate structure presented its own peculiar difficulties: dozer cases, dozer bowls, flywheels, box beams, transmission cases—each product was affected in a disastrous manner by the conditions of porosity.

Products such as dozer cases, flywheels and transmission cases are required to be oiltight. Try to make oiltight structures, however, when pinholes continue to show in your welds! Our box beams and dozer bowls were perfectly sound as far as strength was concerned, but the pinholes were ruining their surface appearance.

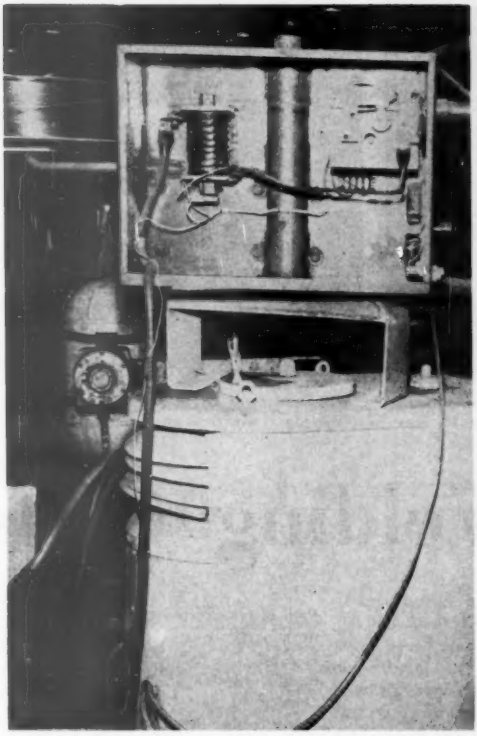
We finally pinned down the porosity to three main causes, which were either directly or indirectly responsible. These were:

1. Impure flux.
2. Arc voltage too high.
3. Arc blow.

Let's have a look at each of them.

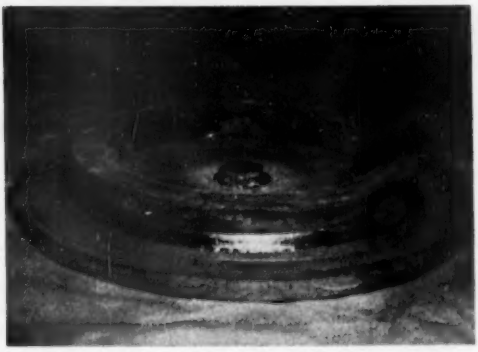
Flux Reclamation

Metal particles, dirt and moisture were ruining our reclaimed flux before it ever reached the operator. We ended this difficulty by putting a magnetic separator on our reclaimer to screen out the metal particles and



2—UPPER CASE contains the equipment that adapts a-c transformer-type welder to semiautomatic welding

3—POROSITY in weld on flywheel. Now look below—



4—SAME type of wheel and weld, but without porosity

in Squirt Welding

by installing a miniature furnace to drive out the moisture. After the flux reaches the work area, we keep moisture away from it.

The important components of our flux reclaimer are indicated in Fig. 1 by the letters A, B, C and D. A is the hammer mill or granulator that regrinds the used flux. B indicates the dust collector. This works on the vacuum principle. The fine powdered flux and dirt that are detrimental to welding are separated from the usable flux at this point. Letter C is the magnetic separator, installed under the conveyor belt. The belt passes over a magnetic pulley, which extracts iron particles mixed in with the flux. The iron-free flux is deposited in a chute directly under the end of the belt. The metal particles stick to the belt for a few more inches and then (as the belt leaves the magnetic pulley) drop into a container placed to receive them.

The brick structure, D, is our baking oven. Constructed of firebricks and fired by natural gas, its purpose is to remove the moisture and oil present in the reground flux. The chute, built of steel channels, is heated by the furnace to a constant temperature of approximately 1,200 F. As the flux passes down this chute, on its way to the container, the moisture and oil are literally baked out of it. By storing the flux in containers that have tightly fitting lids, we keep out the moisture before use.

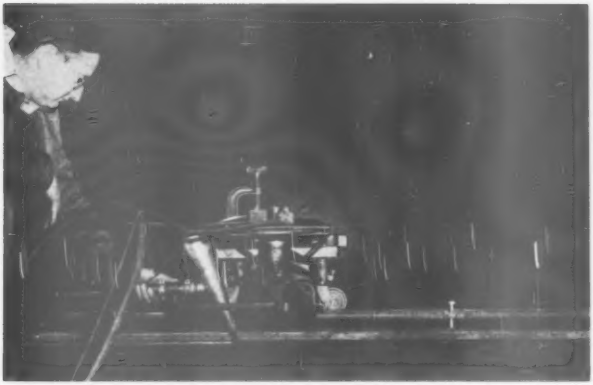
Arc Voltage

The problem of arc voltage was entirely different. Fine metal particles, nicked off whenever the drive wheels of the welding head slipped on the electrode wire, would cake up inside the cable and gun assembly. This caused a resistance. The wire would become harder to push through the cable, and the arc voltage would rise—sometimes as much as ten volts. Such a rise in arc voltage resulted in considerable surface porosity.

Our remedy was to develop a cleaning fluid. It keeps the hose free from foreign particles and, at the same time, provides lubrication for the inner surface of the cable. Used sensibly and consistently, the fluid cured the trouble completely. It is composed of 2 parts of flake graphite to 4 parts of carbon tetrachloride.

Arc blow has always been a headache to users of d-c welders when

(Continued on page 52)



WELDING of longitudinal vertical seam (outside). Tank is laid on its side so weld is horizontal. Welding head travels at 15 ipm

WELDOR tacks angle base ring in place (step 3). Tank is in the rotating fixture

Welding Costs

Here's the way the saving was effected at the Santa Clara plant of the Pacific Electric Mfg. Corp. The tanks are to hold oil for high-voltage circuit breakers.

BY MERRILL F. YALE
Welding Engineer, The Lincoln Electric Co., Emeryville, Calif.

BY SWITCHING to semiautomatic submerged-arc welding methods, the Pacific Electric Mfg. Corp., Santa Clara, Calif., is saving two-thirds the former welding cost in the fabrication of large cylindrical tanks for outdoor high-voltage circuit breakers. The welds are also of greater depth, more uniform and better looking.

Six Steps in Manufacture

The tanks, fabricated of ½-in. mild-steel plate, range in diameter up to 90 in. and in height up to 12 ft. Starting with a one-piece rolled sheet in the horizontal position, the sequence of operations is:

Step one: Butt welding of the longitudinal seam on the inside.

Step two: Butt welding of the longitudinal seam on the outside.

Step three: Tack welding the bottom head and angle base ring to the shell.

Step four: Welding the bottom head to the shell (circumferential weld).

Step five: Welding the base ring to the shell (circumferential weld).

Step six: Welding the top head to the shell (circumferential weld).

The weld penetration is 50% for step 1 and 60% for step 2—or 100% plus—after inner and outer longitudinal welds have been completed. Steps 1 and 2 are at 400 amp (for ½-in. plate); welding speed is 15 ipm. Positive polarity is used in step 2 to secure maximum penetration and to eliminate slag between the inner and outer welds of the longitudinal seam. Other steps are at 370 amp with welding speeds of 12 ipm. All welds are made with 5/64-in. mild-steel electrode wire.

Build Rotating Fixture

The fixture used in steps 1 and 2 differs from that used in the remaining steps. In steps 1 and 2, the shell is in a horizontal position, and welds are made in a straight line. The welding head is mounted on a simple power-driven carriage that moves horizontally on a small track parallel to the seam.

For the circumferential welds, the shell is transferred to a rotating fixture, partially sunk below floor level in a pit. The fixture was designed by Pacific Electric's engineering staff, assisted in part by Lincoln Electric welding engineers. The shell is at an angle of 30 deg with the horizontal when it is mounted in this fixture.

The pit is of such depth that the welding head is always at a convenient height for access and inspection. Were it not for the pit, the operator would require scaffolding so that he could tend to the welding head.

Tangential Speed and Force

The driving and idler rollers of the fixture revolve on heat-treated shafts in roller bearings. A buffer roller is also provided to engage the lower end of the shell. The complete fixture, including the power unit, weighs 1,400 lb. It is designed to accommodate tanks of total weight up to 11,000 lb.

When the tank shell is rotated in this device, its tangential speed may be varied from 3 to 26 ipm. Tangential speed may be thought of as the velocity of any point on the outside of the shell were it to continue along a straight line that is tangent to the curve of the shell. The tangential force supplied by the power unit varies up to 400 lb. Tangential force is the force exerted at any instant

BOTTOM head is welded to shell (step 4). Tangential speed of weld is 12 ipm

ROTATING fixture is recessed in floor pit. Tank rests on rubber-tired idlers. Power unit supplies up to 400-lb tangential force

Cut to 1/3

along the direction of the tangent to the curve of the shell. Not the least interesting part of the design computation was the problem of determining the amount of tangential force needed to overcome the resistance developed because the shell indents into the rubber tires of the rollers. To overcome the friction of this indentation was found to take a considerable part of the total force supplied by the power unit.

The same welding equipment is used for both the longitudinal and circumferential welds. This includes a standard 600-amp motor-generator set that supplies direct current to a manual submerged-arc welding unit.

Welding Unit

The manual unit, completely self-contained, includes a control case, wire reel case, conductor cable, electrode wire-feed mechanism, welding gun and cable assembly. The wire-feed mechanism consists of a variable-speed d-c motor geared to knurled electrode feed rolls. The electrode is taken from the 60-lb coil in the wire reel case and is driven by the knurled rolls through the hollow conductor cable and out through the cone-shaped welding gun. The cone acts as flux hopper and flux dispenser.

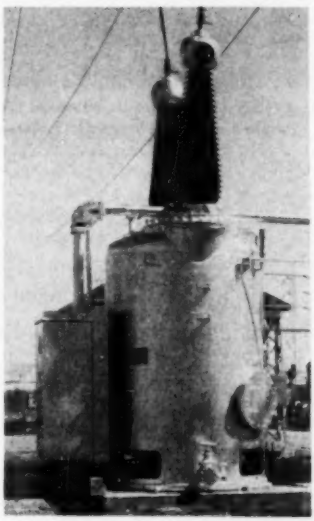
The operator is not required to wear a helmet, or even tinted goggles, because apart from a dull redness at the base of the weld there is no external indication that welding is taking place. The wire-feed mechanism is governed by a control that maintains a constant voltage between the electrode and the work, automatically compensating for any variation in arc length caused by the manual handling.

Comparative Results

A 5/64-in. electrode wire automatically fed from a reel has replaced ¼-in. welding rod. Welding current is stepped up from 250 amp to 370 or 400 amp. Welding speed is advanced from 3-4 ipm to 12-15 ipm.

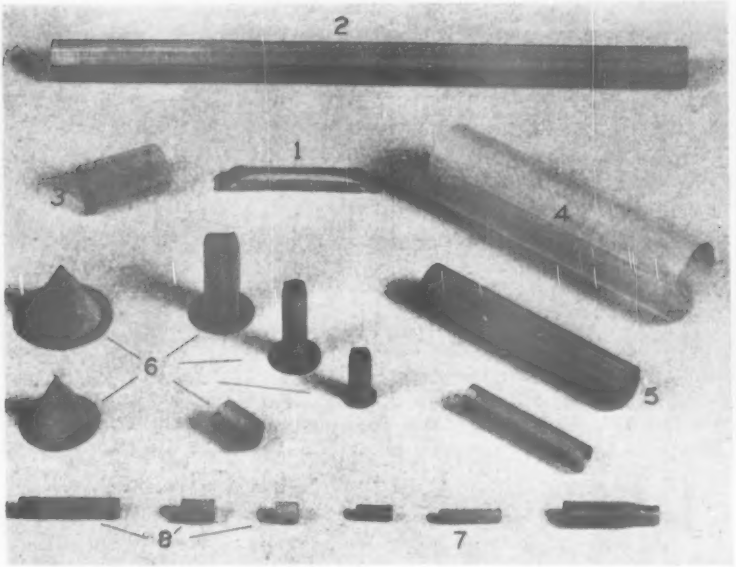
The former edge preparation by scarfing and beveling for the ½-in. longitudinal butt welds has been eliminated. The welds are deeper, more uniform and of better appearance. Weld spatter is completely ended. Demand on the energy of the operator is so greatly reduced that he is enabled to concentrate exclusively on noting the quality of the weld, removal of slag and movement of the work. Otherwise, his principal duty is to keep the hopper filled with flux.

The estimated reduction of two-thirds in the cost of welding for these longitudinal and circumferential seams is thus seen to be but a partial measure of the effectiveness of the semiautomatic welding process.

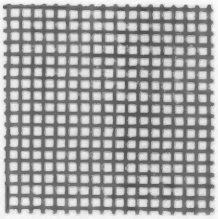


COMPLETED 230-kv, 1,200-ampere circuit breaker tank. Only the top head is visible; bottom head is recessed upward within the lower portion of the protective jacket

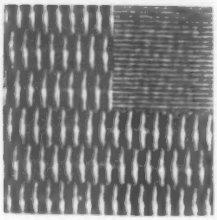
In service, the completed tanks are filled with the oil in which circuit interruptors are immersed. Three such tanks make up the principal bulk of a circuit breaker. The larger sizes of breakers operate at as high as 230,000 volts and will interrupt a short circuit in less than 1/20 of a second. A single three-tank circuit breaker capable of such performance may sell for as much as $90,000.



TYPES of metal-cloth strainers. These are for home and commercial refrigerators, gasoline engines, hydraulic systems, fuel injectors, etc. Key to numbers is in text



Square Weave



Dutch Weave

It's Metal Cloth—

Strainers made of this woven metal fabric are protecting jet fuel lines and wounded GI's. They are also doing sentry duty in hundreds of peacetime services.

BY W. C. HENZLIK

STREAKING down "MIG alley" at 650 mph, jet fighters must have clean fuel. Strainers of woven metal cloth keep out all particles down to as small as 0.0016 in., assuring an even burning rate so that no "hot spots" develop on the engine's burner cans.

Thirty thousand feet below the jets, in the mud of the battlefront, a badly wounded GI is getting blood plasma from a medic's field administration kit. A jar of distilled water and plasma is suspended from the butt of a rifle stuck bayonet down in the ground. Should undissolved plasma powder particles be introduced into the soldier's veins, clots or other complications might cause him to die. His life is protected by a small strainer that is located in the tube leading from the plasma bottle. This strainer is also of a woven metal cloth.

Similarly, millions of other strainers guard the circulatory systems of our autos, our airplanes, our ships and our home and industrial machinery. Stoppages in some of these systems can be almost as serious as battlefield failures. Steam boilers may explode; brakes may fail; airplane engines stop or falter.

Most Mesh Seam Welded

An outstanding producer of hundreds of shapes and sizes of these protective strainers is the Michigan Wire Cloth Co., Detroit. The weaving and fabrication of wire cloth has been this company's business since 1860. During the intervening 92 years, fabrication has progressed through all stages of crimping, soldering and welding. Today the emphasis is upon seam welding.

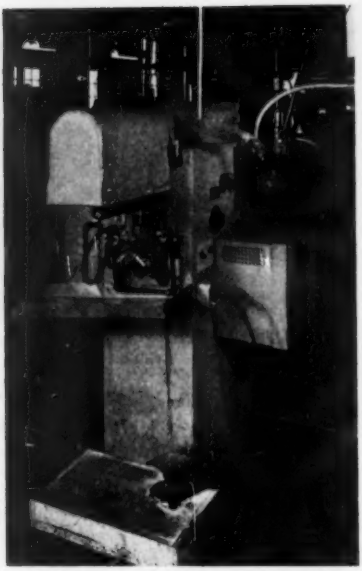
According to the company's chief engineer, Arthur Bull, Jr., seam welding produces clean, economical and strong welds in a great variety of materials: steel, galvanized steel, low and high brass, bronze, Monel, stainless steel, Inconel, Nichrome, Chromel and some new alloys on the strategic list. One of the company's Monel strainers operates at 700 F under a considerable pressure and has never failed. What better proof would you want of weld strength?

Welded joints of nearly 100% strength, reports Mr. Bull, are regularly obtained in Monel, mild steel and stainless steel. However, low brass, phosphor bronze and certain other copper alloys give considerably more trouble; strength of these joints is estimated to average around 75%.

Many Types, Many Uses

Samples of eight types of strainers are pictured at top left. The strainer marked "1" is a model for a home refrigerator; Nos. 2 and 5 are for commercial refrigerators. No. 3 is for an industrial injector; No. 4 for

GIRL operator seam welds brass-wire strainers for an oil burner. Cover of welder is removed to show the pressure-regulating devices



CLOSE-UP of the 7½-kva seam welder. Wheel shaft and arbor are water cooled

and It's Welded

a hydraulic system. The several strainers marked 6 are for industrial pipelines. No. 7 is a strainer for a gasoline engine, and the three strainers labeled 8 are for agricultural spray machines.

For many of these straining jobs, plain square weave cloth (see picture) will do just fine. It is made in the simplest manner of weaving possible—"over one and under one." This metal cloth comes in meshes where the wires are as far apart as one inch or as close together as 250 openings per inch. The wires themselves may be as large as ¼ in. in diameter or as fine as 0.0016 in.

For more ticklish straining duty, where extremely fine particles are found, a "Dutch weave" is used (lower picture). Compared to square weave cloth, the Dutch weave is heavier, denser and stronger. An 80 by 700 twilled Dutch weave will retain particles only 0.0012 in. in diameter.

Pride of the fabrication division is its welding equipment. The 7½-kva air-operated welders have been specially modified for this work. The rolled wire mesh is fitted over the arbor to gage marks. When the foot-operated switch is pressed, welding current flows through the welding wheel as it rolls at a predetermined speed over the weld seam.

Forging pressure on the weld is very critical in the welding of the brasses and the high-copper alloys. Weak welds have occurred when pressure has varied only a few psi from the correct value.

Pressure-regulating equipment and air-motor devices are employed to keep forging force at an optimum. The air motors keep forging pressure at five times line pressure.

Heat control must also be precisely maintained. Through many bitter experiences with low-brass alloys, the company has learned that phase-shift heat control is absolutely necessary when welding this material. Installation of such equipment on all new welders has paid off.

Search for a Wheel Alloy

Research work to find the best seam-welding wheels for each of the various alloys wasn't simple—or fast. The first type of wheel tried was a molybdenum-tired model. It didn't work out because the difference in expansion caused arcing between the copper hub and moly tire. When heated, the tire usually broke loose from the wheel. Another try with molybdenum was made with a wafer wheel, a layer of moly sandwiched between two layers of copper. Aluminum bronze wheels were also tried but didn't fill the bill. Now the welding wheels are made of pure copper, using a metal that is not even an RWMA class alloy. With changes in the machine, the copper wheels have worked out most satisfactorily.

A simple test usually shows whether or not the welder has been set up properly for a specific job. The operator takes the first welded cylinder from the arbor, places it between her palms and rolls it back and forth with a slight pressure. If the weld isn't torn open, it's counted as a good weld. The weld is sensitive to this test since it is more brittle than the parent metal. At the same time, the operator checks the seam visually to inspect it for holes or loose strands.

Altogether, Michigan Wire Cloth uses 14 spot and seam welders to turn out a veritable river of strainers, as many as 100,000 a month.

1—BUILDING a "Texas bed" at Waterloo Industries, Ltd.

2—NOTE roller and end plate at the rear of the bed

Welded Work Horse

Gold is where you find it, and the same holds true of oil. Welding has provided a versatile truck body to carry heavy equipment to fields far from paved roads.

BY T. B. JEFFERSON

THE DISCOVERY of oil in Alberta has brought many changes to that prairie province of Canada. Likewise, it has wrought a revolution in Edmonton, the capital and principal city of Alberta. Oil has changed Edmonton from a trading center and cow town to an industrial city with a population of 160,000.

In the industrial growth of Edmonton, welding has played an important part. Without welding, it would have been impossible to have constructed the large refineries and chemical plants or to maintain the many manufacturing plants that now supply the needs of western Canada.

NEEDED WERE TEXAS BEDS

The discovery of oil has called for a new type of transportation. Oil is rarely found along the railroad right-of-way or beside paved highways, but wherever it is found it must be taken. This requires transportation to the drilling site of such heavy pieces of equipment as drill rigs, engines, tanks, drill pipe, casing and many other items either bulky or heavy or both bulky and heavy. In the Texas oil fields, it was found convenient to transport this equipment by especially designed trucks that were fitted with a rugged body called a "Texas bed."

When the Texans were called to Alberta to help in the oil development, they brought with them their special trucks with Texas beds. They did not, however, bring enough of them. Hence Waterloo Motors Ltd., Edmonton's Mercury-Lincoln dealer, foresaw an opportunity in the 'Texas bed' business. They started production through a subsidiary company, Waterloo Industries, Ltd.

By manufacturing these special beds, Waterloo Motors would be in a position to sell them to oil field truckers. Moreover, the bed could be mounted on a Mercury chassis (the Canadian counterpart of the Ford truck) to offer the trucker a complete transportation unit.

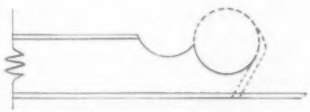
Though the building of Texas beds is still new business for Waterloo Industries, it is definitely on a production basis. The welding crew turns out four truck bodies a week. Even though production is small, it represents a new industrial trend here and provides a new use for welding in a predominantly agricultural area.

MUST STAND TOUGH SERVICE

A truck body to serve in the oil fields must be a versatile unit capable of doing a variety of jobs. Each of these jobs in itself is severe enough to tear the ordinary truck body apart. First of all, the body must be sufficiently strong to carry heavy loads, much heavier loads usually than the truck itself is designed to carry. In addition, the truck should be fitted with gin poles, which will readily form a stiff-leg derrick for a winch capable of lifting or pulling loads up to 15 tons. There should also be provisions for a bolster and pole trailer so that the truck trailer unit can transport 40-ft lengths of drill stems or casings (a considerable weight) without difficulty.

To meet these requirements, Waterloo Industries has designed an extremely rugged welded steel bed. It is built on two long sills, which are spaced so that they will rest on the side members of the truck frame. These sills are 6-in. I-beams, and they are fastened to the truck frame by six $\frac{5}{8}$-in. U-bolts.

By referring to Fig. 1, it is possible to follow the construction details involved in building the Waterloo Texas bed. Cross sills formed of 5-in. I-beams are welded at right angles to the long sills. On the standard bed there are four such cross sills spaced on 16-in. centers.



5—HOW ends of sill beams are flame-cut to provide scallops in the web for purposes told in text

3—PIPE and welding fittings made up the grill guard

4—HEADACHE rack, just behind cab, was also welded

to Hike Oil Output

Before a sill is welded in place, each end is flame-cut as shown in Fig. 5. The scallops in the web are for a particular purpose. The outer recess is provided as a rest for a 4½-in. thick-wall pipe that forms the outer rail of the bed. The inner scallop provides a rest for the legs of the gin pole. The lower flange of the sill is retained; during assembly, it is heated, bent upward to the outer rail and then welded in place.

Construction at the Rear

The rear member of the bed is formed from a piece of 10-in. channel 7 ft 9½ in. long. Inside the outer rail at the rear of the bed, two plates are welded. These plates are ¾ in. thick, 10 in. wide and approximately 2 ft long. They provide the anchorage to which the gin poles are pinned. Another 5-in. channel cross sill connects the inner plates of the gin pole anchor.

In the center of the bed at the rear are the two ¾-in. plates that secure the disappearing snatch block link. This part holds the snatch block when the gin poles are in service. When not in use, it is flush with the bed.

In the center of the bed, 4 in. ahead of the axle centerline, there is a 2-in. heavy-wall pipe and plate combination designed to hold the bolster pin. The heavy-wall pipe is held in line by a framework of 6-in. channels tied to the cross sills.

Referring to Fig. 2, it will be noted that several additional features have been built into the bed frame. The most important is the roller at the rear of the bed. This roller is mounted on two single-row ball bearings, which are recessed in a 1¼-in. plate that has been welded to the rear channel member and to the outer rail. Under the rail is a ½-in. plate, 20 in. deep by the full width of the bed. This end plate provides protection to clearance lights and tail lights. The flame-cut holes give access to the trailer hitch and provide chain slots. The trailer hitch, incidentally, is made of ¾-in. plates and is welded to a cross member of the truck frame.

Adding a Headache Rack

Another change that Fig. 2 shows from Fig. 1 is that a "headache rack" of 2½-in. pipe has been added to the forward end of the bed. The winch, a unit of 30,000-lb capacity, is mounted on long sills and bolted to the truck frame by means of 1-in. U-bolts. This winch is powered by a power take-off from the engine of the truck and is controlled from the cab.

The headache rack is welded up as a unit. It not only protects the winch but also the cab of the truck from damage by loads that might be placed too far forward on the bed. In addition, it provides a place to stow many of the chains and tools that are needed to make the truck effective. A spare wheel and tire can be mounted on the top of the rack. On each side, there are bars and hooks where chain boomers and snatch blocks may be hung when they are not in use. The tops of four of the six vertical pipes are left open and give useful carrying space for crowbars, long-handle shovels, etc. The horizontal member across the top and front of the headache rack not only ties the unit together but provides a protective mounting for directional lights and clearance lights.

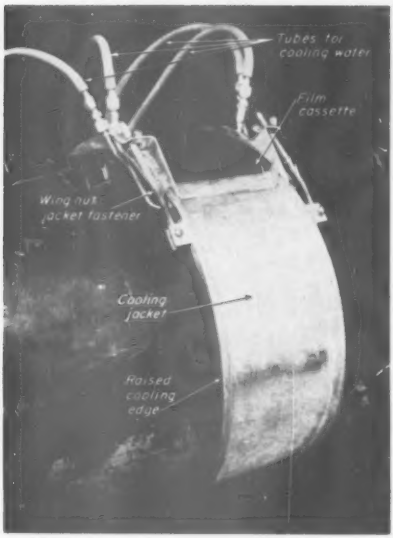
And a Welded Grill Guard

You can see the finished truck in Fig. 3. Please note the welded grill guard. This guard was built up of 3-in. pipe and welding fittings. The lower open ends of the pipe were welded to a flame-cut ½-in. plate, which is bolted to the bumpers. The three welding fittings provide the long-radius 90-deg bends to give a smooth, streamlined guard. For additional bracing, ½ by 3 in. bar stock is extended from the guard through the radiator grill to the truck frame. With such a heavy-duty guard to protect its front end, the truck may be used to push other vehicles.

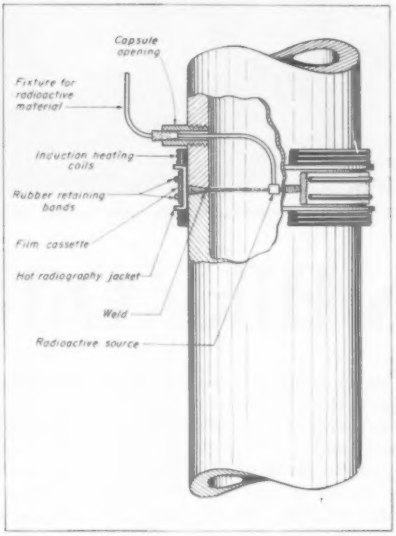
Figure 4 pictures the completed truck body from the rear. Note the welded steel tool box, below the Texas bed and just forward of the rear wheel. A welded steel gas tank is mounted in a similar position on the left-hand side of the truck.

Oil may be responsible for the development of this new enterprise, but if it were not for welding Waterloo Industries would undoubtedly have difficulty in building these truck bodies. As it is, welding has allowed the making of a versatile piece of equipment.

"Hot Radiography"



1—Hot radiography cooling jacket is clamped around pipe by means of wing nut fasteners. Jacket is hinged on opposite side (not shown). Cooling water circulates through hollow jacket sections.



2—CAPSULE of radioactive material is held through an opening in the pipe near a weld. Diagram also shows position of heating coils, cooling jacket, a film cassette and rubber retaining bands.

An interesting new process appears to bypass the considerable delay involved in ordinary radiographic techniques for the inspection of high-pressure piping.

BY ALEXANDER GOBUS
Metallurgist, Sam Tour & Co., New York

INDUSTRIAL X-ray film is vulnerable to temperatures higher than 100 F. Hence the weld metal must normally be cooled to at least that temperature before any radiographs can be taken. In the case of heavy pipe sections and with certain types of alloys, this means a long, long process of postweld stress relieving before the cooling can even begin. Then, after the cool weld has been radiographed, several more hours of preheating are necessary before welding can be resumed.

Let's look at a specific example. The piping concerned is for a power plant and was designed to carry steam at 1,050 F and 1,500 psi. The pipe is made of an alloy steel containing 2¼% chromium and 1% molybdenum. The pipe wall is 3 in. thick and the OD is 17 in. Close dimensional tolerance and careful inspection are required.

The alloy is sensitive to thermal shock due to rapid change in temperature. For this reason, induction coils preheat the pipe joint area to 600 F before any welding is done: after welding a stress-relieving temperature of 1,300 F is maintained before cooling.

32 Hours to Cool

Table I, left-hand side, gives the time that is involved under conventional radiography for postweld stress relieving and cooling. The figure is astonishing. It takes 32 hours to postheat and cool before radiography can begin, three more hours to preheat after the films have been exposed. Since the radiography itself requires around 3 hours, altogether 38 consecutive hours are required between welds—a much longer time than is required for any one group of passes, even for finish welding.

There ought to be a quicker way of doing it. There is.

A new "hot radiographic" technique known as the McElroy-McNutt process (licensed exclusively to Sam Tour & Co., Inc.) offers striking advantages when it is applied to alloys that would otherwise require a postheat, controlled cooling and preheat cycle for each radiographic inspection. As a result, the total time required to weld pipe joints in high-temperature pipe lines is reduced by approximately 55%.

The new method does not require a different type of X-ray film. It uses the same film as before, but the film is protected by a water-cooled jacket. This jacket consists of two hollow semicylinders that are hinged to each other at one end and fitted with wing-nut fasteners at the other. When a radiograph is to be taken of a hot pipe weld, the jacket is placed between the induction coils and clamped around the pipe.

Let's see what happens under this method.

Saving Was 94½ Hours

If you will look at the right-hand side of Table I, you will notice the blank spaces opposite the lines C, E, G and I. There is no postheat and cooling and no preheating prior to welding. The total saving is 94½ hours—57½% of the former time.

Cuts Inspection Time

Table I. Times Required to Weld High-Temperature Steam Pipe

Conventional Radiography			Hot Radiography		
	Welding Operation	Hours		Welding Operation	Hours
A.	Preheat	3	A.	Preheat	3
B.	Weld first ¾ in. (5 passes)	9	B.	Weld first ¾ in. (5 passes)	9
C.	Postheat and cool for radiography	32	C.	— — — — — — — — — — — — — — —	—
D.	Radiographing and developing film	3	D.	Hot radiography	½
E.	Preheat	3	E.	— — — — — — — — — — — — — — —	—
F.	Weld to 1¾ in. (14 passes)	10½	F.	Weld to 1¾ in. (14 passes)	10½
G.	Postheat and cool for radiography	32	G.	— — — — — — — — — — — — — — —	—
H.	Radiographing and developing film	3½	H.	Hot radiography	1
I.	Preheat	3	I.	— — — — — — — — — — — — — — —	—
J.	Finish welding	27½	J.	Finish welding	27½
K.	Postheat and cool	32	K.	Grinding overlay	3
L.	Grinding overlay	3	L.	Final hot radiography	1
M.	Final radiography and developing	3½	M.	Postheat	15
	TOTAL	165		TOTAL	70½

Note: Items K, L and M are for different operations on the two sides of the table. No flaws occurred in either joint so no allowance is made for chipping out defective metal.

This is even better than the 55% formerly cited as an approximate average saving.

Under each technique, radiographs were taken at two intermediate positions. The first radiographs were taken after ¾ in. of weld metal had been deposited, the second set after 1¾ in. The reason why the amounts of deposit differ is that flaws are most likely to occur near the root of a weld so that early inspection is advisable. A final radiographic inspection was made after all welding had been completed.

Table I compares corresponding operations in the same horizontal lines except for lines K, L and M. These letters do not designate the same operations on both sides of the table because the final postheat becomes the last operation of all with hot radiography. With the conventional technique, the postheating and cooling is followed by grinding and then by final radiography.

How It Works

The cooling jacket, 17½ in. in diameter and 6 in. wide for the joint discussed, is clamped into position as soon as welding stops. Water is allowed to circulate for several minutes before the cassettes (film holders) are fastened into place and the film exposed. Welding is continued as soon as the exposure is completed.

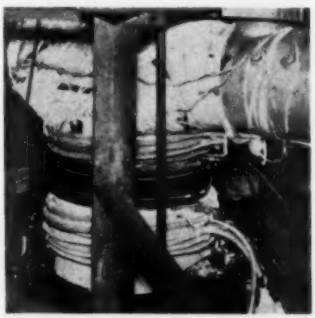
The whole operation is conducted at preheat temperature, and welding need be interrupted for only 30 minutes to an hour, depending on the thickness of the weld and the exposure time required.

The raised sides of the jacket (see Fig. 1) help to maintain an even temperature distribution along the surface and also provide a snug resting place for the film cassettes. The cassettes are held in place with heavy rubber bands (Fig. 3). Three cassettes will cover the entire circumference of the 17-in. pipe.

The radioactive material is held at the center of the pipe by a special jig (see Fig. 2). The arm of the jig fits through an opening near the weld. When the joint is completed, a plug of the same alloy as the pipe is screwed into the opening and welded to the outer pipe surface.

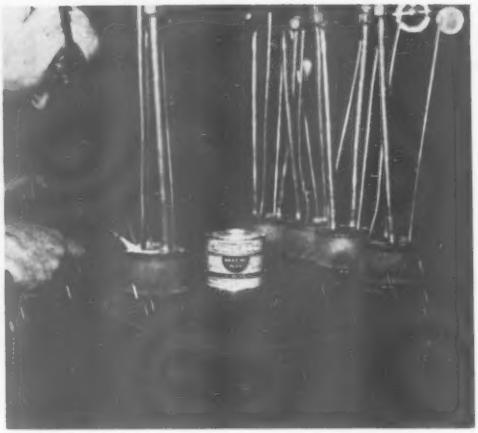
As can be seen from Fig. 2, use of the cooling jacket increases the distance between gamma-ray source and film by approximately ½ in.; it also introduces two thin sections of steel before the film and adds a layer of water that must be penetrated by the radiation. None of these factors has had observable effect upon the radiographs. Penetrameter sensitivity with the new method is at least 2%. This accuracy is equal to that of the conventional method and is easily within the requirements of the ASME Power Boiler Code (Paragraph P 102).

The principles of the new process have been used with similar time-saving results on welding jobs other than pipe. Special cooling fixtures can be designed for surfaces that are not cylindrical.



3—THREE cassettes are held in place with rubber fasteners. Radiography interrupted welding no longer than 30 minutes to an hour.

1—LIQUID receiver for fountain freezer is pressure tested in water with carbon dioxide at 200 psi



2—BRAZING copper tubes to heat-exchanger ends—another job where the joints have to be pressuretight

If It Goes "Pop,"

Pressuretight welding is a major requirement at Sweden Freezer Mfg. Co. One test is the well-known water test. Another is to let air or gas under pressure remain for two or three days in the welded assembly. . .

BY HOWARD E. JACKSON

MUCH of the welding done at the Sweden Freezer Mfg. Co., Seattle, Wash., must be pressuretight welding. The company makes fountain freezers, the sort of thing that you see dispensing soft ice cream in fountains, cafes, restaurants, diners, drive-ins, theater concessions and elsewhere. Sweden fabricates some 20 floor and table models of three main types: automatic-continuous, continuous and batch. These "Speed Freezers" sell for $800 to $3,000 apiece and have national distribution.

Liquid Receivers

One good example of pressure welding will be found in the liquid receivers—the storage tanks that hold Freon 12. This is the refrigerant that freezes the mix in the freezing cylinder and thus changes it to soft ice cream. Every step is important to the manufacture.

The liquid receiver is, basically, a 4-in. cylinder made of boiler tubing. The tubing, which comes in 20 and 22 ft lengths, is cut to proper size by a band saw. Then a jig is clamped over the cut tube, and four holes are centerpunched and drilled in a drill press. These four holes include two ½-in. inlet and outlet holes for the Freon and two 11/32-in. holes tapped for ⅛-in. pipe connections to indicating valves (valves that indicate whether or not there is sufficient Freon in the receiver).

With holes drilled and tapped, the tubes are sandblasted inside and out. Now comes a tricky welding job: the addition of the solid top end to the open tube. The end is ⅛ in. thick and is so made that its outside diameter is not much larger than the inside diameter of the tubing. Consequently, little end surface sits on the end of the tubing. As there is little metal-to-metal contact, there is great danger of blow through. The weld is run fast, using 135 amp with ⅛-in. E-6013 electrodes. The machine is a 225-amp a-c arc welder.

Two heavy-duty couplings are welded to the liquid receiver by similar methods. These are ⅜-in. tubes. Some 40 feet of ⅜-in. copper tubing (wrapped on an engine lathe) is put inside the receiver, and then the second end (bottom) is welded onto the large tube. The problem is the same as the welding of the first end. The bottom end has three holes drilled in it: two 7/16-in. holes and one 11/32-in. hole. Copper tubes are inserted into the 7/16-in. holes, and the 11/32-in. hole is to accommodate a ⅛-in. heavy-duty pipe fitting. These parts are oxyacetylene brazed into the holes, using filler rods dipped into brazing flux.

Arc welding is then done to join two 5/16 in. bolts, ¾-in. long, to the outside of the receiver cylinder. These bolts are jig located to coördinate with two parts during final assembly. They are arc welded at 120 amp with the same ⅛-in. E-6013 electrode.

The last step is to soft solder or sweat the two indicators into their precut 11/32-in. holes. This work is done with the oxyacetylene torch, using a 30/70 wire solder with acid flux.

The liquid receiver is now ready for pressure testing (Fig. 1). Carbon dioxide is tied into the receiver through a check valve, a pressure of

3—FREEZING cylinder is silver brazed while rotated on foot-operated turntable

4—HOT WATER is used both to remove the brazing flux and to test the cylinder-sleeve unit. If bubbles are seen, the work is rejected

It's Okay

200 psi is applied, and the receiver is submerged in water in a metal tank. If any bubbles show, the receiver is sent back for rewelding. For a double check, the carbon dioxide is left in the receiver until it goes to assembly. Should the gas escape, there will be no "pop" when the valve is opened. In this case, the receiver is marked "flat" and sent back to welding. Receivers are made up and checked in batches of 120.

Heat Exchangers

Figure 2 shows the brazing of copper tubes to the ends of heat exchangers. Practically everything that has been said about the liquid receiver applies also to the heat exchangers, the second pressuretight unit. The same material is used, same lids, same copper tubing brazed into cover, same testing, etc. The part is sandblasted after welding, and a chromatic etch is put on. Cleanliness is essential, due to the fact that there are strainers in the expansion valves, dryers, and compressors.

The third good example of pressure welding is provided by the freezing cylinders themselves. These cylinders have capacities that range from four to 20 quarts of ice cream. Fitting over the stainless-steel cylinder is a refrigerant sleeve. This is cut out of 20-gage cold-rolled steel, rolled to shape and spot welded along the seam. It is made slightly larger than the stainless-steel cylinder. The forward end of the sleeve fits into a curved flange at the front end of the cylinder. The rear end, flush with the end of the cylinder, is first dressed with a preening ring, then $\frac{3}{8}$-in. copper tubing is snapped into the space between the sleeve and the cylinder base. This circular tube, known as the bulb well, is soft soldered to both cylinder side and sleeve, using a regular soldering iron.

Silver Brazing Cylinders

The assembled unit is put in a jig for the addition of the suction tube, continuous feed, liquid line and other parts preparatory to silver brazing. The jig (Fig. 3) is adjustable and is built through the work bench so that it may be turned by foot. The sleeve is brazed to the rear bulb well, the bulb well ring to the cylinder. An

5—SPOT welding joins the stainless-steel outer shell of the ice cream mix compartment of freezer

6—SPIRAL is welded to dasher, using a special jig to avoid warping and stainless-steel electrodes

7—WELDING of legs to freezer frame follows definite sequence to avoid distorting frame out of square

8—FINAL assembly: copper tubes from the expansion valves to heat exchanger are braze welded into place

oxyacetylene torch is used with silver-brazing flux and low-temperature silver alloy in rod form (1/16-in. rod). When the flux melts and looks glassy, the weldor is ready to add the alloy, which he runs in smoothly to fill the gaps.

Another job on the freezing cylinder is to silver braze into place a machined hub of cast bronze (used as an adapter between the gear case and the cylinder). The hub is silver brazed to the bottom of the cylinder over an appropriate hole. Here, too, as the flux gets glassy the silver alloy is applied. The work is in a revolving jig, and most of the heat is applied to the hub so as not to burn the stainless-steel cylinder.

Eight nuts are soldered to the back side of the flange at the front end of the cylinder. Later, stud pins are soldered into some of these nuts.

The cylinder-sleeve unit is now ready to undergo testing (Fig. 4). The entire unit is submerged in hot water and air under pressure is introduced through the liquid line leading into the space between the cylinder and the sleeve. The hot water serves the additional purpose of soaking off the flux. The glassy flux is removed first; otherwise the bubbles that indicate leaks might not be observed. The unit is left in the water for three to five minutes. If no leaks are found, it is put under 150 psi pressure, through a check valve on the liquid line, sealed in and left for two to three days. At the end of that time, the pressure is released. If it pops, okay. If it does not, this indicates a leak, and the unit goes back to welding.

An insulation jacket, similar to the sleeve but slightly larger, is cut, rolled and fitted over the entire unit, where it is fastened with sheet metal screws. The Bakelite front is then put on, using the stud pins and screws. The space between the insulation jacket and refrigerant sleeve is filled with hot tar and cork.

In addition to liquid receivers and freezing cylinders, the soft ice cream mix compartment contains a stainless steel outer jacket that must be spot welded (Fig. 5).

Stainless Dashers

Although it does not come under the head of pressuretight welding, the welding of the stainless-steel dashers used inside the freezing cylinders is noteworthy. The dasher pushes the soft ice cream to the front of the cylinder. First, the ends of the dashers are cut to size with the band saw from 5/8-in. and 1-in. stainless steel bar. Four holes are drilled in the drill press, and the necessary counterboring, broaching and slotting is accomplished in the machine shop.

A tee fitting is welded to one end of the bar, using a 200-amp d-c welder with 1/8 or 3/32 in. 19-9 stainless-steel electrodes (E308-16). The weldors tried an 18-8 electrode but found dasher welds cracked when they cooled. The tee is welded on with a setting of 80 amp while the part is held in a special jig. Lots of 300 are made up at a time.

The spiral for the dasher is made by cutting 1/4 by 1/2 in. stainless-steel bar to length and wrapping it on a mandrel. Also, 1/4-in. stainless-steel rods to connect the two ends of the dasher are cut to length. The spiral and the two connecting rods are then welded to the ends in a special dasher jig (Fig. 6). Clamps are used to avoid warping. This welding is also done with a 19-9 stainless-steel electrode.

The rods are put in 3/32 in. short of the overall dimensions of the dasher. When the weld is ground off smooth, it won't leave a depression, indicating (if not actually showing) the rod end through the end piece.

Welds are ground smooth with high-speed grinders. If there were any pits, holes or cracks in the dasher where ice cream mix could "hide," it might turn sour and spoil the next batch. To avoid such a possibility, every little hole is ground out and welded. Then the collar is silver brazed around the inside of the connecting rods, and a fitting is silver brazed to one end. As a final step, the dasher is polished. In this connection, it is most important not to get too much silver alloy on the dasher, or there will be too much polishing to do.

Frames for Freezers

Making frames for the fountain freezers is still another application of welding at this plant. These frames are made of 3/16-in. angles and band iron. Frames must not be off-square more than 1/8 in. when cut, notched, punched and bent to shape. The freezer frame is welded by standing the square bottom and top on a heavy steel work table and placing the legs between them (Fig. 7). Furniture

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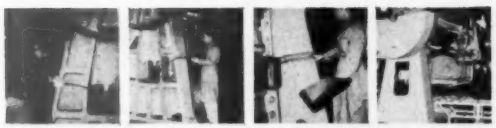
Let us prove it in YOUR shop, just as we have in over 78,000 other plants and shops throughout America. There's no cost, no obligation involved. Just fill in and mail the coupon, below, for a FREE Consultation-Demonstration from one of our 350 trained District Engineers who stand ready to serve you from coast to coast. **Prove to yourself that there is something new and different in metal-joining . . .**



"IMPOSSIBLE" REPAIR AVOIDS TWO YEAR SHUT-DOWN

"The folding press shown in the photos had been in service a great many years and during that time, cracked one leg of the side frame. Temporary repairs were unsuccessful and cracking of two other legs occurred, making the machine unusable.

After various welding companies had decided against repairing this machine by any welding method, we called for a EUTECTIC Consultation and were told that the repair *could* be made with EutecTrode 24, your special electrode for welding cast iron "cold".

As recommended, we supported the weld repair by boxing in the complete side frame with steel plate and attaching the closely fitted plate to the frame with fitted bolts. The repair made in this manner was *completely successful* and the machine now operates as efficiently as a new unit.

An idea of the enormous savings we realized by using your unique welding alloys can be had when we tell you that quoted delivery on a new machine was at least two years!"

—Steelbilt Co.*

*Full name and address on request.

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clamps are used to hold the work. The jig is made with 90-deg corners to assure the weldor that the frames will be square when welded.

The machine is a 225-amp a-c welder, and 5/32-in. E-6013 electrodes are used. A definite sequence is followed. As the top and bottom are clamped upright with the first two legs between them, welding is all one way: front leg at the bottom, down to back leg at bottom, to back leg at top, to front leg at top. When the frame is turned over for the other two legs, welding is done in the opposite direction. If the weldors do not follow this sequence, the frame will warp out of square. The rule is: weld in the opposite direction each time a frame is turned 90 or 180 degrees.

Final Assembly

Welding plays a prominent part right down to final assembly. One of the first steps in final assembly is to braze weld the copper tubing and joint fittings. The oxyacetylene torch is used, with phos-copper rod for copper tubing and silver-alloy rod for steel tubing (using a silver-brazing flux). An example of final assembly welding is the braze welding of tubes from the expansion valve to the heat exchanger (Fig. 8). For this work, phos-copper rods are employed.

HOW WE CURED POROSITY

(Continued from page 39)

they work inside boxlike structures. In conventional welding techniques, a-c transformer-type welders eliminated arc blow, so we asked ourselves: 'Why not build an a-c squirt welder and see what it will do?"

That's just what we did! With minor electrical changes, plus a few changes in arc-voltage control design, we made it work. The machine stands up well under tough production schedules, and it also cuts maintenance costs.

Figure 2 pictures our a-c squirt welder case. The wire-feed mechanism, which automatically feeds the filler wire to the work, is preadjusted by means of the arc-volt selector (shown protruding on the lower right side of the upper case). The power is supplied to the driving rolls by a small variable-speed d-c motor, speed of which is automatically controlled by the arc voltage. Wire from the reel is drawn through the feed rolls, then pushed through the conductor cable to the gun itself.

When the arc is struck, a magnetic field is set up in the large coil (left center of the upper case). This closes the four-contact relay, completing the circuit to the feed motor. The motor then starts the wire on its journey through the conductor cable.

Revamping of our jigs and welding procedures also helped to end the headache of arc blow. We found that in channel box beams or similar structures where long, straight seams are encountered, we could partially control arc blow by placing a block of wood or other non-conductive material under one end of the piece and then welding away from the grounded end. In further experiments along this line, we raised the end of the box beams still farther and ran the weld downhill. We found that surface porosity was practically eliminated when the slant was approximately 15 deg. The weld flattened out nicely, pinholes disappeared and the speed of travel was increased by 20%. It is true that less metal per lineal inch is deposited, but there is still enough weld metal to provide a joint of sufficient strength. We now use the "downhill" welding method on all of our channel box beams.

By treating each problem individually and recording the results, we have been able to conquer surface porosity under most conditions. Figure 3 shows a weld on a flywheel that exhibits bad surface porosity. In Fig. 4, a weld on the same type of work, surface appearance has improved immeasurably.

"YOU SAY YOU FOUND THESE NICE CORN HOLDERS LYING AROUND THE SHOP?"

BETTER, FASTER WELDING

(Continued from page 37)

Figure 3 shows the method of weld preparation. The machined cut on the rod—½ in. long and ¼ in. deep all the way around—fits into a similar groove machined on the connecting-end casting. The parts are assembled together in a fixture and tack welded in four places.

The piston rod is ready for automatic welding in Fig. 4. The white coating is an antispatter compound, applied to prevent the tack-welding spatter from adhering to the machined rod.

We see a more comprehensive view of the welding head in Fig. 5. This is a different head from the one used to weld the shovel booms, and it is mounted on a side beam that is fastened to a single column (outside of picture toward the left). This side beam can move up or down and can also be swung in an arc over the work. A turning fixture revolves the piston rod under the welding head.

Figure 6 shows the submerged-arc weld being made. To hold the flux in place, the operator uses a cut piece of rubber hose—a simple but effective method. Three passes fill the welded area.

Hydraulic Cylinders

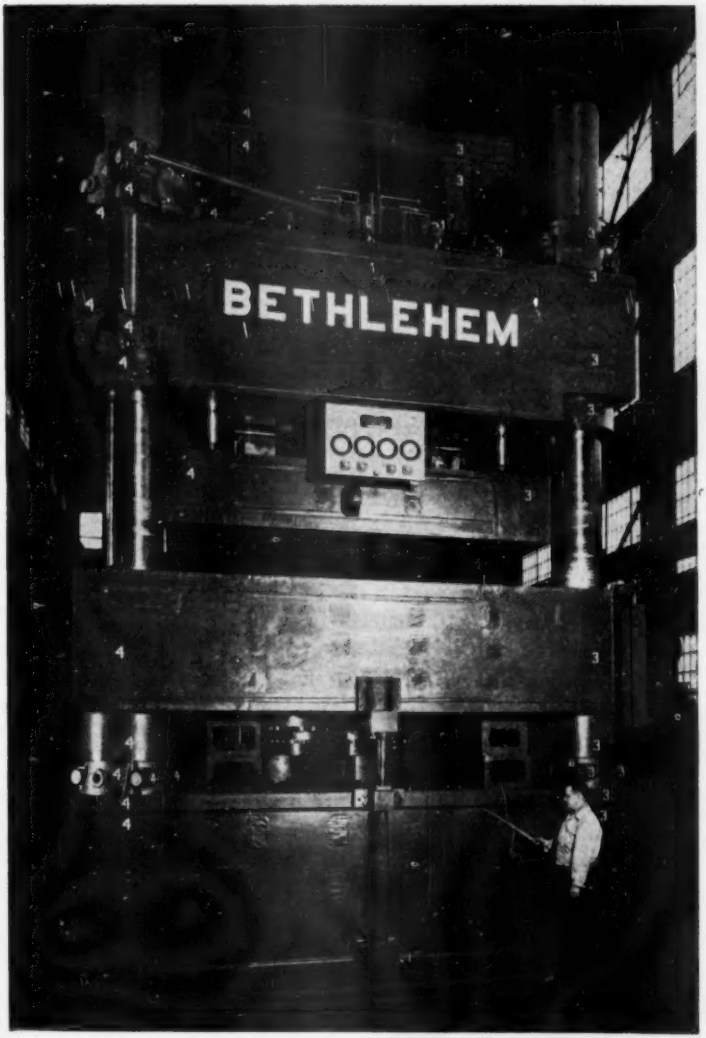
The same boom-mounted welding head is also used for welds on hydraulic cylinders, made for the purpose of attaching bolt-ring flanges. The flange is a hexagonal casting, while the cylinder is a tube of ¼-in. wall thickness and a diameter of either 6 or 7 in. Two circumferential welds are made to join the flange—one on the inside and one outside. These welds must be wholly free of porosity.

In Fig. 7, the outside welds may be seen in the cylinder resting on top and the inside welds on the cylinders below. The cylinder at front right is in the as-welded condition, while those at front left have been machined. At the other end of each cylinder, an end cap (not shown) is welded on.

How the parts look assembled upon a tractor may be seen in Fig. 8. This picture shows the shovel boom, connecting rods and the cylinders into which the rods fit.

Photos courtesy of Linde Air Products Co.

4000-ton forming press has 75% welded construction



This 4000-ton, hydraulic double-action forming press was built by Bethlehem for the Standard Railway Equipment Manufacturing Company. It has a 17 ft, 2 in. top platen, a 21-ft bottom platen, a 17 ft, 2 in. crosshead, and a 12-ft blankholder. Its total weight is 1,043,030 lb. About 75 pct of its construction involved the forming and welding of plate steel at Bethlehem's Weldment Shop.

In the construction of most any press, machine, or machine part, Bethlehem Weldments can be used to good advantage. For example:

Bethlehem Weldments are economical. They eliminate excess weight, without sacrificing rigidity. Their use frequently means a lower manufacturing cost for the finished product.

Bethlehem Weldments are versatile. They cover a size range so wide as to meet virtually every need. And they can be produced either as simple parts or intricate assemblies.

Bethlehem Weldments offer freedom of design. This is because the steel from which they are made can be bent, pressed or shaped prior to welding without harm to its physical structure. In addition, they can be combined effectively with forgings or castings.

There's every reason to believe that you will find Bethlehem Weldments to your liking. A Bethlehem representative would be glad to talk it over with you at your convenience. Just contact the nearest Bethlehem office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

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LINDE'S News of Metalworking

Worn Parts Rebuilt Economically by UNIONMELT Welding

Repair of worn tractor parts is most practical and economical with specially developed fixtures on which standard UNIONMELT welding units are mounted. The metal deposited by UNIONMELT welding is so smooth that no grinding or finishing is required. Experience indicates that resurfaced areas will wear as long as new parts.

The Berkeley "Conservall" fixture is designed especially for rebuilding crawler tractor track links or rails without disassembling them. The track is placed in a trough and clamped in position. A LINDE side-beam carriage

Tractor rail links rebuilt in "Conservall" machine by UNIONMELT *welding. Cams automatically control welding action for each link.*

moves the UNIONMELT welding equipment over the positioned track and the welding of each link is automatically started, stopped, and accurately controlled. Rollers, idlers, sheaves, and other circular work can also be welded or resurfaced on another section of the machine.

The "Leader" machine is also available for rebuilding both cylindrical and flat parts. Rollers are rebuilt on top of the machine. Larger parts, such as idlers, are mounted in the chuck at the side of the machine as shown. With the flat work attachment, parts such as disassembled track rail links, grousers, bulldozer blades, end bits and fabricated members can be resurfaced easily. This attachment is operated by a gear which is mounted in the chuck.

These tractor rollers and an idler were rebuilt at a speed of 30 in. per min. by UNIONMELT *welding.*

With both machines, the wheels can be tilted for rebuilding the flanges. It takes only 80 to 90 minutes to rebuild a D-8 track roller. Idlers take about three times as long.

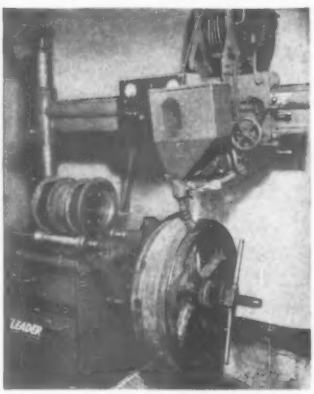
OXWELD 1928 rod is normally used in making these repairs. When wear is excessive, OXWELD 296 rod is sometimes used for the initial buildup which is then finished with OXWELD 1928 rod. For such resurfacing, use either Grade 80 or Grade 90 UNIONMELT welding compositions.

For some services, a finishing pass with a higher alloy tube rod is applied to produce a harder surface. While material of almost any hardness can be applied, one combining hardness and toughness lasts longer than one of higher hardness that tends to spall and chip. As deposited, OXWELD 1928 material has a hardness of about Rockwell C-25, but in service the working surfaces actually develop properties which cause them to outwear deposits that are substantially harder.

Advantages of UNIONMELT Build-up

UNIONMELT welded resurfacing is especially attractive with these automatic machines which readily permit deposit rates of 20 lbs. per hour. Savings in time and the advantages of a smooth uniform deposit justify the initial investment in automatic equipment. Important in these times is the conservation of metal realized with the process. The use of approximately *one hundred pounds of weld metal saves replacement of 2,000 to 3,000 pounds of new parts.*

LINDE's engineers and technicians will be glad to give further information about UNIONMELT welding. Telephone or write today.



UNIONMELT *welding head on "Leader" fixture rebuilds rollers and idlers. Rollers are welded on top of the machine, idlers at the side, and flat parts, depending on their size, can be welded on top of the machine or in the flat work attachment.*

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
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Offices in Other Principal Cities
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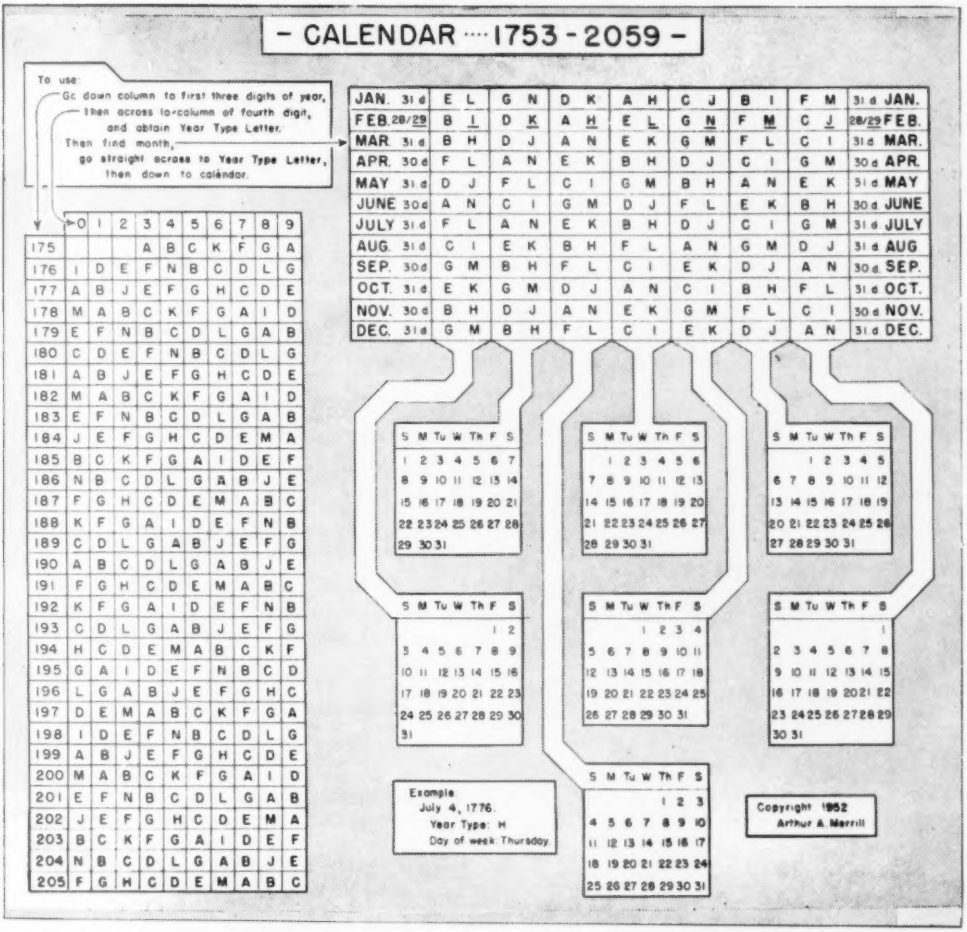
Perpetual Calendar


- CALENDAR ···· 1753 - 2059 -
To use:
Go down column to first three digits of year,
then across to column of fourth digit,
and obtain Year Type Letter.
Then find month,
go straight across to Year Type Letter,
then down to calendar.
Example
July 4, 1776.
Year Type: H
Day of week: Thursday.
Copyright 1952
Arthur A. Merrill

THIS brain-child of Arthur A. Merrill, a General Electric engineer at Schenectady, N. Y., looks complicated at first glance. Naturally. After all, it's quite a trick to be able to tell the day of the week for any of 112,129 days—over 307 years.

Try a problem, however, and see if some of the complication doesn't disappear: On what day of the week was the Declaration of Independence signed? You know, of course, that the Declaration was signed on July 4, 1776. Start with the left-hand table and go down the left column to the first three digits of the year, "177." Then go across to the column headed by the fourth digit, "6." and obtain the key letter for the year 1776. It should be an "H." Still with us?

Now, turn to the right-hand tabulation. Find the month of July in the upper horizontal tabulation and move straight across until you strike the year key letter, "H." Drop down immediately and follow the chute to the calendar. This shows us what July looked like in 1776, and you can tell at once that the Declaration of Independence was signed on a Thursday. It's that simple!

You can go forward as well as back—find what day your hundredth birthday will fall on or what weekend holidays we'll have in, say, 1966. It's easy once you get the hang of it.

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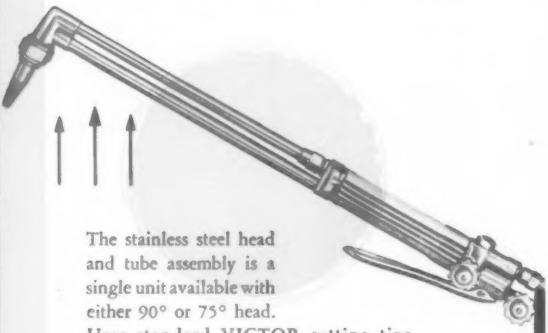

The stainless steel head and tube assembly is a single unit available with either 90° or 75° head. Uses standard VICTOR cutting tips.

Try it on heavy scrap cutting as shown here. Ask your VICTOR dealer for a demonstration NOW.

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SANTA CLAUS

Could Die of Old Age

No one shoots Santa Claus. This remark about a government which spends and spends and spends may well be true. But it is also true that Santa Claus is an old man. At his age overwork might well kill him.

It is with the possibility of working Santa Claus to death that this editorial is concerned. No position is taken as between the contending political parties in the present campaign. Our concern is with the problem of protecting Santa Claus.

It is true that as a nation we now enjoy great prosperity. The prosperity is not nearly so general as the political advertisements of it would suggest. Millions of individuals, notably those living on pensions, annuities and other fixed incomes, have been robbed of half their purchasing power by inflation during recent years, and whole industries know little or nothing of boom times.

However, measured by so basic a gauge as unemployment, we do have great prosperity. Less than two million of our total working force of over 64 million are unemployed, and many of them are unemployed only while moving from one job to another. The real income, i.e., what their dollars will buy, of those with jobs is somewhere near its all-time peak.

Our Prosperity is Precarious

The prosperity we enjoy, however, is precarious. This is primarily because it is dependent upon a rising volume of expenditures by the federal government. At present almost a quarter of our entire national income is ladled out through Washington, and in an ever increasing amount.

If, as matters now stand, federal expenditures were to be suddenly and sharply cut, our government-financed prosperity would be severely upset. But if the federal government were to try to keep right on providing prosperity by steadily increasing its expenditures, the end result would be more certainly disastrous. It would be a crash caused primarily by having continuing inflation of prices destroy the value of the dollar.

Higher government expenditures of worthless dollars then could accomplish nothing. Santa Claus would be dead from overwork.

To Provide Firm Foundations

The general route to be followed in putting firm foundations under our prosperity is quite clear. It involves two steps which must be taken closely together. The first is to stop the continuous increase in federal expenditures. The second step is to substitute expanding private business for government-financed business as the principal foundation of expanding prosperity.

The increase in federal expenditures can be stopped without sacrificing any effective measures now directed toward meeting our top priority requirement—protection from armed Communist aggression. The most competent authorities of both major parties agree it can be done by (1) better planning of and the elimination of outright waste in defense arrangements, and (2) cutting those civilian expenditures which cannot be justified at the same time we are undertaking a great new load of defense expenditure.

It is also possible to substitute expanding private business for government-financed business. The problem is primarily that of relieving private business of the staggering load of federal taxation it now is carrying. Federal taxation now takes 52 per cent of all corporate profits and 82 per cent of all so-called excess profits. If it were not for the forced draft placed under our economy by rapidly mounting defense expenditures, this burden would surely lay a disastrous blight on private business expansion. If expanding private business is to have a chance to play its critical role as a subtitute for government-financed business, its taxes must be cut, and soon.

It Won't be Easy

It would be naive to contend that it will be easy to check the expansion of federal expenditures. They have been running wild too long, and in the process contributing to a feverish, inflationary prosperity. Likewise, there is no reason to believe that the easing of the load of business taxes is going to be easy. The basic blight it puts on business expansion has been too long obscured by having our economy dosed with artificial stimulants, most notably enormous injections of federal expenditures.

The Key Question—How Long?

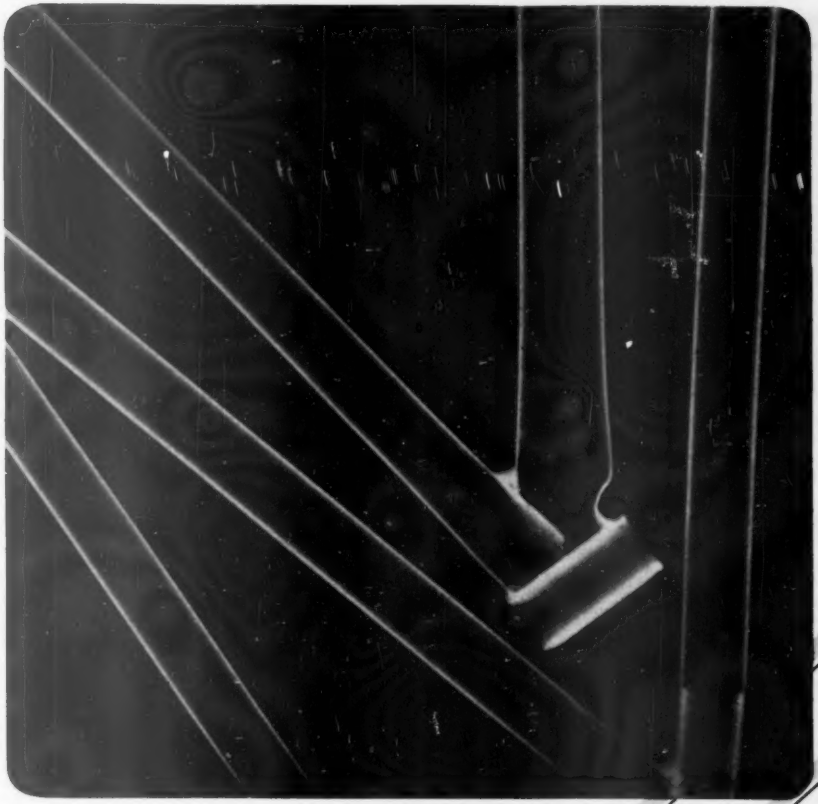
It is obvious that prosperity is going to be a major topic of discussion in the present political campaign. There is nothing the matter with that. Prosperity is a key concern of the voters in choosing a national administration.

To make the discussion of prosperity really useful, however, it is important to ask and get answers to the right questions about it. The key question is not whether or not we have prosperity. That we have it in large measure is generally conceded.

The key question is, "How long can we continue to have prosperity?" The answer—not very long if we continue to rely primarily on new injections of inflationary federal expenditures. Santa Claus, be it remembered, is no youngster. If we continue our present improvident course, he will be worked to death. Those politicians, regardless of party, who see this clear danger and who have plans to escape it are facing up to the crucial question about our prosperity.

McGraw-Hill Publishing Company, Inc.

Radiography checks—



then double checks

LANDING GEAR STRUTS lead a life of punishment. Though light, they must be strong. Their joints must be sound. Radiography is the method used to prove them sound.

A maker of amphibian aircraft goes even further. Though treated and sealed, strut members can develop internal corrosion and become weakened. Radiography alone can provide the required nondestructive examination of these internal surfaces. So it has become routine to x-ray these struts as part of the periodic inspection of the planes.

This is but one example of how radiography is proving a boon to the welding process. It is helping to open new fields for the use of welding—especially in the fabrication of highly stressed products and assemblies.

Look into the ways Radiography can aid your business. Your x-ray dealer will be glad to give you full information and assistance.

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Radiography—

another important function of photography

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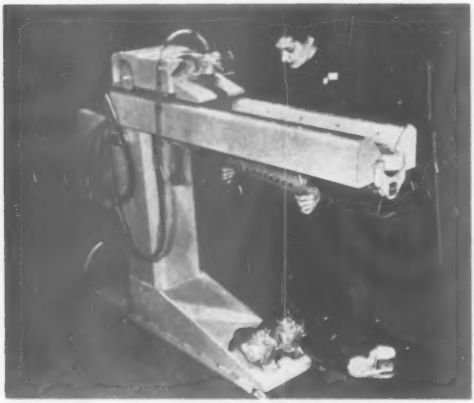


HIGH QUALITY butt welds in aluminum or stainless are claimed for new Solar inert-arc welding fixtures

COOLER operation and easy cleaning feature newest Linde inert-arc torch. It saves on tungsten costs, too

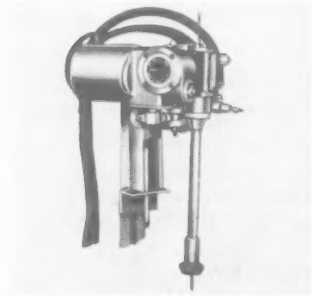
Inert Butt-Welders

250 NEW manufacturer in the welding machine-positioner business is Solar Aircraft Co. It is placing on the market two models of inert-gas-shielded butt-welders that were originally designed to precision fabricate aircraft and jet engine components.

Once these machines are set up, they can be easily operated by semi-skilled help. Specially-designed work-holding clamps hold aluminum or stainless steel components very firmly. Filler rod may or may not be used with these machines, depending on the gage, type of metal and end use of the product being welded.

SOLAR AIRCRAFT CO., San Diego 12, Calif.

* * *

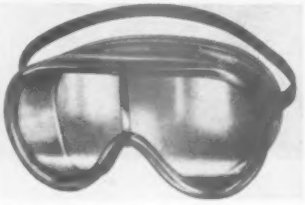


Recoats Burned Zinc

251 A NEW attachment for butt-welding machines automatically recoats with zinc the weld-burned areas on galvanized sheet. It stops and starts with the welding and forming equipment on the production line and is positive in application. Speed of coating replacement is set to conform with the speed of the line—the average being 100 ft per minute.

METALLIZING COMPANY OF AMERICA, Chicago 24.

* * *



Cover Goggles

252 AN extra-wide lens, improved nosebridge design and a soft plastic frame are said to make the Model 440 "Eye-Saver" cover goggle easy to wear for long hours. It is large enough to fit over the biggest metal or plastic-rimmed glasses. The replaceable lens is held in with a metal lock bar.

No scratches appear on the lens when the goggle is laid face down on a table—a special "bumper" front frame protrudes beyond lens level.

WATCHEMOKET OPTICAL CO., INC., Providence 3, R. I.

INFO-AID CARDS
on pages 17-18, filled out with item numbers of products catching your eye, will bring you additional information about them.

Water-Cooled IG Torch

253 AN improved water-cooling system is featured on the HW-10 torch for inert gas-shielded arc welding. It has a rated capacity for continuous duty of 300 amp and either h-f stabilized a-c or straight polarity d-c can be used.

Cooling water flows directly into the torch body, up to the torch head, through the water jacket, through the head again and out through the power cable. This new cooling system permits placement of the collet body closer to the arc without heat damage.

Water passages are readily accessible for quick, easy cleaning if hard water is used for cooling. To clean them the outer half of the two-piece holder is removed, the hose is disconnected and a rod is pushed through the cooling water tubes.

Electrodes can be changed or adjusted in only a few seconds with no wrenches necessary. A quarter turn releases the torch cap. Steel collets align new electrodes automatically. Two torch caps are available permitting the use of either 3-in. or 7-in. electrodes.

LINDE AIR PRODUCTS CO., New York City 17.

* * *

Bright Finish Aluminum

254 AUTO trimming, display fixtures and other metal brightwork may soon be made from Alcoa C57S, a new aluminum alloy that takes a bright finish. It can possibly replace certain applications of chrome plating or stainless steel. Its forming

and mechanical properties are said to be good.

ALUMINUM CO. OF AMERICA, Pittsburgh 19.

* * *

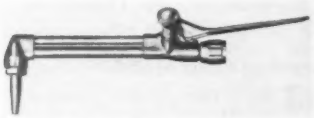
Welding Water-Saver

255 AN ADDED protection for resistance welding equipment is the new "Water Saver" control. It automatically protects the welder during operation and when idle, protects it from condensation and possible electrical failure. It is said to save on water flow and damage from sweating, rust, corrosion and mineral deposits.

Another possible use of the equipment is in inert-arc welding, where it can be adapted to control the gas around the torch. In both cases, water or inert gas flows for a predetermined time after welding ceases to safeguard the heated parts. In the case of the resistance welder, the operator has 1½ minutes between welds before the water stops flowing.

ROBOTRON CORP., Detroit 19.

* * *



Cuts 8-in. Steel

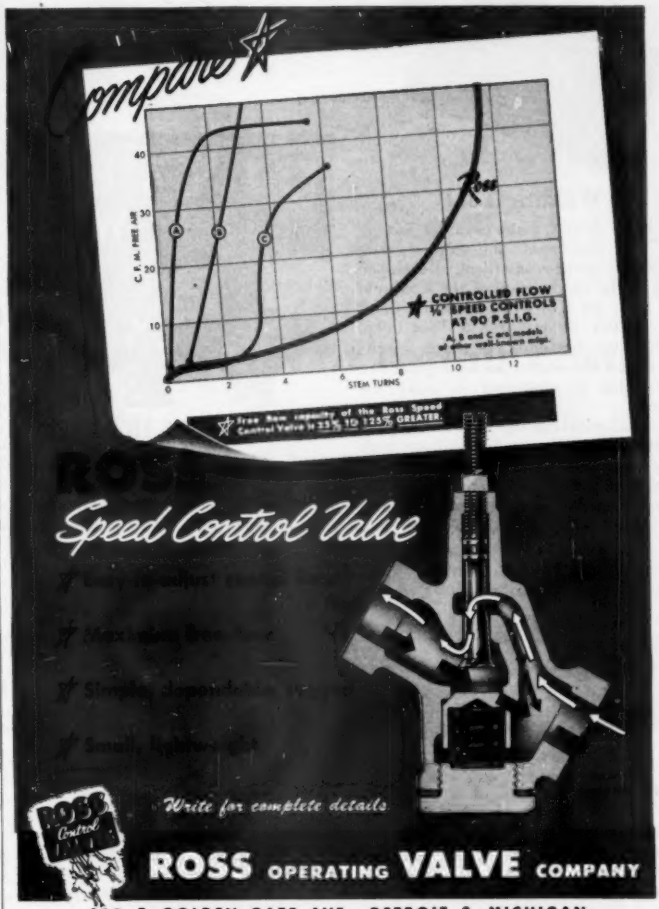
256 A NEW cutting attachment for either of two Linde welding torches cuts steel up to 8-in. thick. This is from 2 to 4 times the thickness that previous models could cut. Because of new design features, including a large-diameter oxygen delivery tube and an improved mixer, only 55 psi oxygen is needed for 4-in. steel and 100 psi for 8-in. steel.

Called the Type CW-122 cutting attachment, it connects to the W-121 and W-122 welding torches with only a hand-tightened nut. No wrench is needed. For various cutting jobs, the customer has 23 different tips to choose from.

LINDE AIR PRODUCTS CO., New York City 17.

(Turn to Page 60)

IF IT'S A VALVE FOR WELDING— ROSS HAS IT


Compare
C. F. M. FREE AIR
STEM TURNS
Ross
CONTROLLED FLOW ½" SPEED CONTROLS AT 90 P.S.I.G.
Free flow capacity of the Ross Speed Control Valve is 25% TO 125% GREATER.
ROSS
Speed Control Valve
Write for complete details
ROSS OPERATING VALVE COMPANY
120 E. GOLDEN GATE AVE., DETROIT 3, MICHIGAN

Cold Welding Tool

257 A NEW butt-welder for joining aluminum and copper wire doesn't utilize any heat. Developed with the cooperation of the Koldweld Corp., the tool will be manufactured by Utica Drop Forge & Tool Corp. The two wire ends are simply inserted into the welder and the plier-like handles are squeezed to make the weld.

The wire can be drawn after the weld is made and tensile-strength tests indicate that the weld joint is just as strong or stronger than the parent metal. When the weld flash is cleaned off, the joint is no larger than the wire itself. This is an advantage in power transmission cable and other electrical wire because of less interference, less chance of electrolytic action and less tendency to fail by twisting.

The Koldweld process can also be used to join flat sheets of nonferrous metals. (See THE WELDING ENGINEER, Jan., 1949). Neither of these tools are in production yet but will be available shortly, according to word from Utica.

UTICA DROP FORGE & TOOL CORP., Utica, New York.

* * *

Grit Paper with Holes

259 OPEN-MESH design of new "Gritcloth" solves the old problem of clogging on sandpaper and other types of abrasive-coated papers and cloths. Now the removed particles flow right through a screen-like cloth which has abrasive coatings on every cross thread. Life of the cloth is said to be 10 or 15 times that of coated papers. It may be used on either wood or metal.

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.

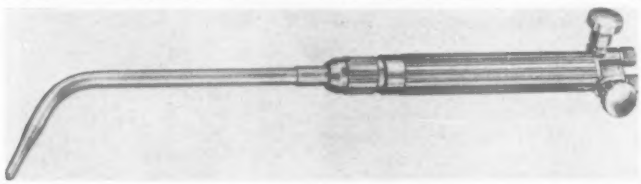
* * *

Bronze Electrode

260 WELD metal of superior quality is claimed for a new phosphor bronze (grade C- 8% tin) coated manual arc welding electrode. Clean slag removal is another advantage. Mechanical properties of the "Weldbest 620C" weld metal are: tensile strength, 61,000 psi, 33,000 psi and elongation in 2-in., 42.5%. Quality of X-ray pictures is good. Operation with direct current reverse polarity is recommended; 100-120 amp for the 3/32-in. size and 190-230 amp for the biggest, 3/16 in. size.

WELDWIRE CO., INC., Philadelphia 25.

* * *



Interchangeable Welding Tips

258 A SERIES of 13 new tips or welding heads that fit interchangeably on "Prest-O-Weld" W-121 and W-122 torches provides a complete range of tips for welding or heating work on practically any metal from 32-gage to over 1-in. thickness. These tips are of the snap-in type and are attached to the torch handle by means of a hand-tightened connection nut. No wrench is needed to get a gas-tight seal as synthetic rubber "O" rings seal each tip to the torch handle.

Tip sizes are spaced so that welding ranges overlap. Size numbers, from 2 to 100, are stamped on each tip. These numbers indicate the flow rate in cu ft per hr of oxygen and acetylene when the tips are used at the recommended operating pressures. If you know the flow rate, it is easy to estimate gas consumption for any job.

The larger Purox W-202 and W-201 also have 13 interchangeable welding tips of the snap-in type fit. The W-202 has ample capacity for continuous heavy welding and heating on any metal from 32 gage to plate or castings 1 in. and over in thickness. Handle of the W-201 is 1½ in. shorter than the W-202, but otherwise they're identical. Because of the shorter handle jobs requiring more than 55 cu ft of oxygen and acetylene per hour are usually too hot for the W-201. It was designed for welding of metals from 32 gage to ⅝ in. thick.

LINDE AIR PRODUCTS CO., New York 17, N. Y.

Brazing-Clad Metals

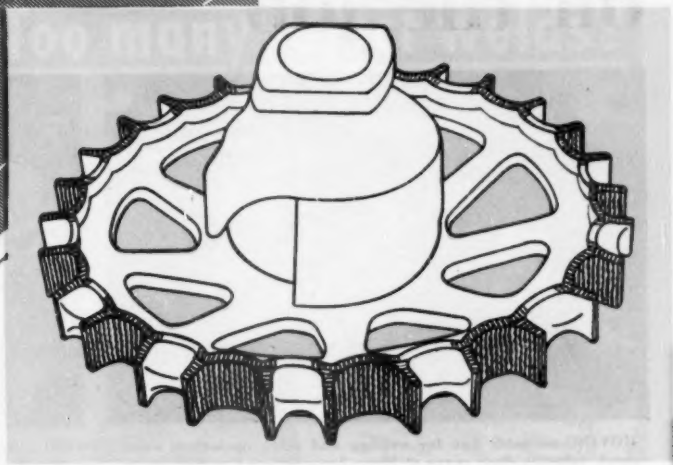
261 BIG savings in silver alloy and rejects are claimed for new "Braze-Clad" metals where the brazing alloy is diffused into the surface of the base metal before heating. Such metals are combinations of various base metals (ferrous and nonferrous) clad with a predetermined thickness of silver brazing alloy on one or both sides.

Time is saved in fluxing, cleaning and heating since there is no need to wait for capillary action to take the alloy through the joint. Hardly any finishing is needed because there aren't unwanted burrs, fillets or overflows. Applications so far include large-diameter, high pressure pipe lines, powder metal and honeycomb structures and aircraft engine bearings.

AMERICAN SILVER CO., INC., Flushing 54, N. Y.

(More New Products on Page 86)

How AMSCOATING with Amsco Hardfacing Rods saves you materials . . . manpower . . . money.



These teeth take bites out of repair costs!

AMSCOATING can make old Tractor Drive Sprockets last 3 times longer than new.

Here's another way to beat the high cost of replacements, down-time and maintenance . . . AMSCOATING the teeth on Tractor Drive Sprockets. Time after time service records have shown that AMSCOATING of sprockets results in these dollar-saving advantages:

1. ***On an average — 3 times the service life of a new, unhardfaced sprocket.***
2. ***2 out of 3 sprocket changes completely eliminated . . . far less down-time, less maintenance . . . more equipment out of the shop and on the job.***

To top it off, sprocket replacements can practically be eliminated. An AMSCOATED sprocket can be reclaimed over and over again . . . *at about half the cost of a new one!*

Get all the facts on how to make these big savings . . . write today for instruction sheet on AMSCOATING sprockets, and the name of your nearest AMSCO Distributor.

AMSCOATING...stands for control of wear by Hardfacing...

Hardfacing rods—and recommendations for their use—are as sound as the manufacturer who makes them. AMSCO has been fighting wear for a half-century—first with Manganese Steel, and later with AMSCO Hardfacing Products.

If you have a problem of wear caused by impact, abrasion, heat or corrosion . . .

Find out how AMSCOATING can save you materials . . . manpower . . . money!

AMSCOATING
THE RIGHT WAY TO SAY HARDFACING

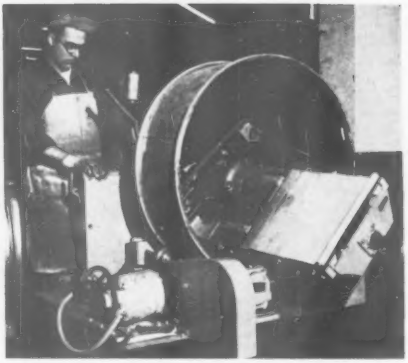
AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
382 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que. Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

on the job

MOVING assembly line for welding and other operations saves much valuable floor space at Ryan Aeronautical Co., San Diego



BELT SANDER moves laterally as jet case is rotated, grinding two rows of welds at a time

Belt Line for Welding

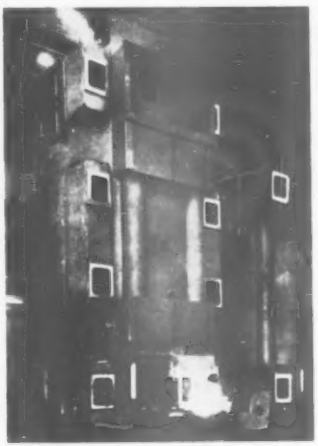
A CONTINUOUS belt conveyor system similar to those used by the food packaging industry was designed for welding and related operations at the Ryan Aeronautical Co., San Diego, Calif. This new fabrication line is geared to turn out thousands of exhaust manifolds for the Continental model 1790 engines that power the M-46 and M-47 General Patton tanks.

The 1790 exhaust manifold consists of five separate and differing components: an outlet section, two mid-sections and two end-sections. Though each requires different operations performed upon it, all must flow down the same line at uniform speed.

Eighteen separate tasks, including assembly, spot welding, arc welding, sandblasting, sizing, facing and inspection must be performed along the line without any back-tracking of parts. The machines, tools and jigs had to be carefully positioned, and the exact number and spacing of these elements had to be coördinated with the conveyor line speed. Engineering and tooling changes had to be worked out to permit each operation to be performed under production-line conditions.

The picture at top left shows one end of the motorized belt, which stretches for 140 feet through the heart of the factory. The manifolds are picked up at this end after having been spot welded together on the adjacent jigs. The flanges are attached by arc welding, which is done in curtained booths flanking the line.

The new belt line has resulted in a substantially increased production of 1790 Continental manifolds in a floor space that is only half the space that would have been required by the former method of fabrication.

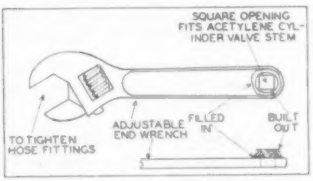


GARGANTUA was a giant of monstrous size, so the name certainly applies to the above 168,200-lb generator stator frame built at General Electric Company's Schenectady works. This monster required more than 3,000 ft of arc welds. For the horizontal and vertical positions, E-6010 electrodes were used; for the flat position E-6020 electrodes. The frame was placed horizontally on a set of turning rolls so that most of the welding could be done flat to take advantage of the deposition rates of large-size electrodes.

Automatic Weld Grinding

A DOUBLE row of welds on jet-engine case assemblies has to be ground as a production operation at the Des Moines, Ia., plant of Solar Aircraft Co. When the grinding was done by hand, the operation was slow. Now Solar has incorporated a rotar belt sander in an automatic grinding fixture (see pictures at top right). The Solar-designed belt moves laterally as the case assemblies are rotated. The result is that production has increased 400% over the former grinding method.

* * *



Torch-Cylinder Wrench

By Thomas Trail

LIKE to have a combination wrench that you can use for: (1) tightening welding torch and hose connections or (2) operating the valves (both flush and sunken types) of acetylene cylinders? If so, you can make one readily.

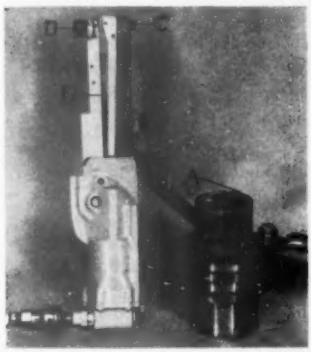
First fill in and build out the end of the handle of an adjustable end wrench (see sketch). Then file a square opening in the built-up material to fit the valve stem of your acetylene cylinders.

Tool for Tube Welding

ROHR Aircraft Corp., Chula Vista, Calif., was confronted with the job of spot welding the overlapping ends of two telescoped tubes. The problem was to develop a new spot-welding tool that would allow the telescoping tubes to be turned without any interference with the welding.

The company's tooling department made a tool (patented) that meets all the requirements. The tubes to be welded are placed in a heavy copper ring that embraces the larger tube and serves a supporting fixture. The welding is done by a portable welder having two pivoted arms. Ends of the arms are inserted inside the smaller (inner) of the telescoped tubes. One arm carries an insulating tip and the other a copper welding electrode. The heavy copper ring and the electrode are connected to the ends of the cable supplying the welding current.

Picture below gives the details of the operation.



See text for explanation of letters

Tubes to be welded (A) are held in copper-ring fixture (B). Welding electrode (C) and insulation pad (D) are inserted inside inner tube. Wedge (E) forces (C) and (D) apart and into contact with smaller of telescoped tubes. The welding current then flows from (C) through the tubes to ring (D) to effect the weld.

A tension spring holds the two pivoted arms close together until air pressure is introduced to operate the wedge. When the air pressure is released, the spot weld is ended and the arms close for another operation. To weld at another spot, the operator merely turns the welding gun and readmits air to the pneumatic cylinder operating the wedge. The tool can be used to weld tubes of different diameters and thicknesses.

Rohr has patented the device and is manufacturing it for its own use but so far not commercially.

Too many reject welds?

Type 300 Oven

Automatic thermostatic control, 175 to 550° . . . holds 350 lbs. of rods (18" size) . . . safe, adequate 840 watt heater . . . completely wired for 110/220 or 220/440 volt AC . . . sturdy welded-reinforced sheet metal construction . . . insulated — low heat loss, low upkeep.

Engineers say most defects in high-strength welds — X-ray porosity, rough welds, under-bead cracking, etc. — are caused by moist electrodes. Because low-hydrogen type rods absorb moisture so fast (often within 2 hours), rejects and reworks start piling up unless you protect unpackaged electrodes from moisture.

DryRod — the original shop-tested *portable* electrode oven — safely preserves the manufacturer's "baked-in" quality . . . keeps rods within the .2% moisture limit allowed by U. S. Govt. Specifications. DryRod's *exclusive circular design* assures even heat distribution without fans — plus giving great strength with light weight. Protect yourself against costly rejects, reworks, scrap loss . . . preserve electrodes conveniently, at low cost, with DryRod. Write for free bulletin.

DryRod — always made by, and now also sold by PHOENIX
Dry Rod—Trademark

Play safe — don't risk faulty welds, scrap loss, costly reworks or production slowdown due to wet electrodes. Maintain rods at top efficiency, ready for instant use on high-strength welds. DryRod pays for itself — costs less than 10c per day to operate . . . gives you convenient storage of varying sizes and types at point of use.

Phoenix Products Co.

DryRod Electrode Oven

DryRod—always made by, and now sold by PHOENIX

WRITE FOR FULL INFORMATION

Phoenix Products Co. X-DR-6
4715 N. 27th St., Milwaukee 16, Wis.

☐ Send new bulletin DR-752 explaining how DryRod can save me money on high-strength welds

☐ Send chart showing recommended temperatures for various mineral-coated electrodes

Name .....

Company .....

Address .....

City ..... State .....

ATOMIC CANNON carriages are positioned and welded on assembly line at Pittsburgh plant of Dravo Corp.

ATTRACTIVE scene greets customers of Sommerfeld Welders Supply, Oshkosh, Wis. Truck fleet is at right

NEWS

Spring Meeting for AWS at Houston, June 16-19

SOMETHING entirely new for welding people will be the First National Spring Technical Meeting of the American Welding Society next June 16-19 in Houston, Tex. The glamorous Shamrock Hotel there will be the scene of the technical sessions and next door in the Shamrock Hall of Exhibits will be a Welding and Allied Industry Exposition. Both the hotel and the exhibit hall are fully air-conditioned.

The AWS has selected Houston for its first spring meeting because of the tremendous industrial and welding expansion in that area in the last few years. Future plans and developments for industrial Houston seem headed for even bigger goals.

The technical paper program will include papers and symposia on welding and allied subjects of national and regional aspect and technical subjects of interest to the specialized industry of the southwest, aircraft, oil, chemical and shipbuilding. It is expected that this comprehensive program will draw a very large attendance of top executives, engineers, metallurgists, production men, fabricators, process plant men, shipbuilders and others concerned with welding.

Advance notice of the meeting and exhibit is being sent now to welding and allied people. Full information is available at The American Welding Society, 33 West 39th St., New York City 18.

* * *

Atomic Cannon Carriages Welded at Dravo Corp.

CARRIAGES for the newly-announced atomic cannons are made on a welding and machining assembly line at Dravo Corp., Pittsburgh. A total of 8,200 ft of welding seams goes into each carriage. Most of it is laid in the downhand position because of the elaborate welding-positioner set-up Dravo has established. All welds are inspected before and after stress-relieving by either the magnetic particle or dye penetrant processes.

Despite the problems of design and manufacturing, the first carriage was shipped to Aberdeen Proving Ground from Dravo's Pittsburgh plant only 10 months after the formal contract was awarded.

Largest weldment in the assembly is the top carriage which is 38½ ft long. It is made up of two double-web girders joined by transverse steel frames. Stainless steel flanges are fixed to the bottom of the girders. Steel castings are welded inside for bearings and gears.

Side girders of the carriage were built in special jigs. During final welding stages, the carriage is rotated 11 different times to follow a welding sequence that minimizes distortion. All steel castings in the top carriage were preheated before welding. After welding, the carriage was sandblasted, given an acid bath and painted.

The cradle tube assembly is a heavy alloy steel casting, with stiffeners and trunnions of the same material. It was preheated to and maintained at 700 F for welding.

* * *

1,500 Visitors Attend Distributor Open House

CUSTOMERS and friends to the tune of 1,500 dropped in to see the new building occupied in August by Sommerfeld Welders Supply Co., Oshkosh, Wis. The open house celebration drew people from all over central Wisconsin, where the company serves an industrial area radiating 75 miles from Oshkosh.

The new 80 by 106 ft building is made of concrete blocks and cast stone construction and serves as home base for four trucks. For drive-in customers, the building is situated on a 2½-acre tract to provide ample parking space.

The company was started by George Sommerfeld in 1939 and has grown rapidly since. Nowadays, in addition to welding supplies Sommerfeld provides a 24-hour oxygen therapy service for homes and hospitals within 30 miles of Oshkosh.

* * *

IAA Meets at Atlanta Next Year, April 13-15

THE 1953 convention of the International Acetylene Association will be held April 13-15, at the Biltmore Hotel in Atlanta, Ga. The IAA program, publicity and arrangements committee is meeting this month in Atlanta to discuss the arrangements.

PENNSYLVANIA OPTICAL COMPANY

ANNOUNCES ITS NEW LINE OF SAFETY GOGGLES!

The 220 Series Goggles

The new 220 Series Goggles are designed to give the utmost in eye protection. Comfort is assured during continued wear by proper balance combined with lightness of weight. This results in worker approval and a higher factor of safety. Varied combinations make these goggles adaptable to many industrial operations requiring positive eye protection.

- ★ Metal construction combines comfort with strength and long life.
- ★ Designed to permit unobstructed side to side vision.
- ★ Heat treated safety lenses, individually tested for impact resistance, and examined for optical perfection.
- ★ Flat or curved lenses—either clear or absorptive green in medium, dark and extra dark shades.
- ★ Many combinations of side shields, lens sizes and bridge widths.

For illustrated folder, containing prices and detailed information, write directly to Pennsylvania Optical Co., Reading, Penna.

Order Direct and Save!

PENNSYLVANIA OPTICAL COMPANY
READING, PA.
Known for Fine Ophthalmic Products Since 1886

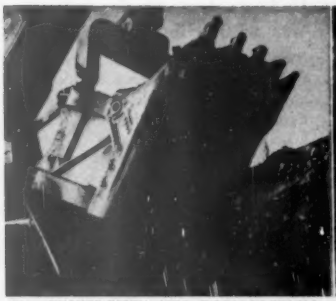
Stoody Alloys save shovel parts!

Hard-Facing restores life at a fraction of new part cost!

You can get new and longer life from worn shovel parts by hard-facing with Stoody Alloys! Cost of reclamation is far less than for new parts. Regular maintenance procedures thereafter save costly down-time, spare parts inventory and needless replacements.

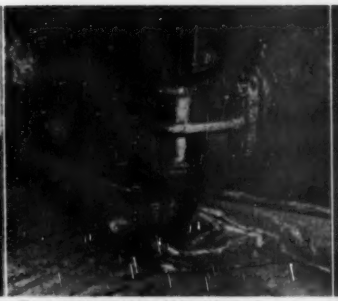
Check your shovels today against the suggested rebuilding operations pictured at the right. Detailed manual procedures are described in the new revised STOODY GUIDEBOOK. Get it from your Stoody dealer or by mail.

Custom welding shops equipped to handle automatic rebuilding work are located in every section of the United States and Canada. Write for list of shops near you.



1 **BUCKET TEETH, LIPS, SIDES, BOTTOMS**

ALLOY: *Stoody Self-Hardening 21 or Stoody 1027.*
APPLICATION: *Manual—stringer beads or solid overlays on wear areas.*
RESULTS: *Maintains size, reduces wear, retains full bite and load.*



2 **LATCH PLATES AND KEEPERS**

ALLOY: *Stoody Self-Hardening or Stoody 1027.*
APPLICATION: *Manual—build to size and peen to shape while red hot.*
RESULTS: *Effects positive latch closure. Negligible cost.*

3 **SHEAVES**

ALLOY: *Stoody 104 or Stoody 107.*
APPLICATION: *By automatic—machinable deposit.*
RESULTS: *Prevents grooving, increases rope life.*

4 **HOUSE BASE RINGS**

ALLOY: *Build up with Stoody 104, finish with Stoody 107.*
APPLICATION: *By automatic—machinable surface.*
RESULTS: *Reclamation ¼ of new ring cost.*

5 **HOUSE ROLLERS**

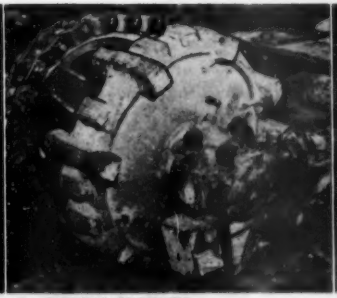
ALLOY: *Stoody 107.*
APPLICATION: *By automatic—machinable surface.*
RESULTS: *Restores contour, doubles life at 1/3 the cost.*

6 **SHOVEL IDLERS AND ROLLERS**

ALLOY: *Stoody 105.*
APPLICATION: *By automatic—no finishing necessary.*
RESULTS: *Restores wearing faces, doubles life at ½ original cost.*

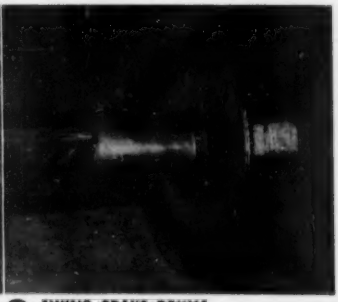
7 **TRACK PADS**

ALLOY: *Stoody 1027.*
APPLICATION: *Manual—rebuild with Stoody High Carbon, overlay with Stoody 1027.*
RESULTS: *Doubles life at ½ cost.*



8 **DRIVING TUMBLERS**

ALLOY: *Coated Stoody Self-Hardening or Stoody 1027.*
APPLICATION: *Manual—rebuild drive lugs.*
RESULTS: *Doubles life at ½ original cost.*



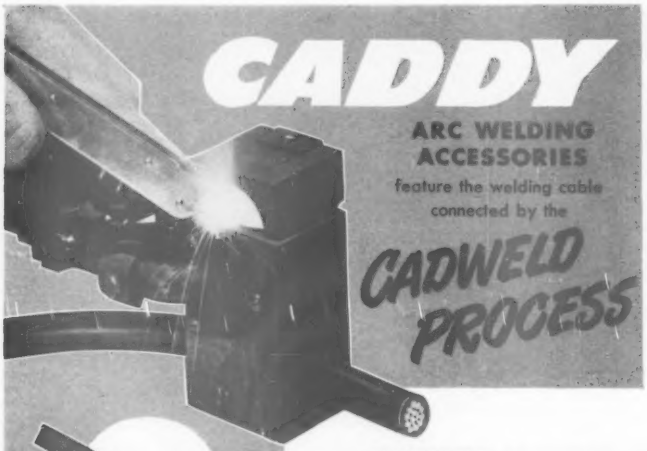
9 **SWING BRAKE DRUMS**

ALLOY: *Stoody 106.*
APPLICATION: *By automatic—machine to finish.*
RESULTS: *Illustrated type reclaimed for 15% of new cost, outlasts new drum.*

See the "yellow pages" in the phone directory for your local Stoody dealer, or write for dealer list and complete literature

STOODY COMPANY

11941 E. SLAUSON AVE., WHITTIER, CALIF.



A CADWELD Connection Has No Equal! It Is . . .

SPLICE

LUG

QUICK CONNECTOR

GROUND CLAMP

ELECTRODE HOLDER

ECONOMICAL Easily made with inexpensive equipment—No special skill required.

FAST Requires no preparation of cable other than stripping of insulation. Time required to make weld less than one minute.

BETTER Has current carrying capacity equal to the cable. Tensile strength equal to soft drawn copper. No damage to insulation when properly applied.

PERMANENT Not subject to the gradual loosening or oxidation of mechanical joints. Not damaged by excessive overload.

COMPACT Weld area is not over 1¾" long.

CATALOG ON REQUEST

"CADDY" ARC WELDING ACCESSORY DIVISION
ERICO PRODUCTS, INC. • 2070 E. 61st PLACE • CLEVELAND 3, OHIO

Undergraduate Engineers Win $5,000 in Prizes

RESULTS have been announced in the fifth annual Engineering Undergraduate Award and Scholarship Design Program, sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland. Engineering undergraduates in 23 different schools won a total of $5,000 and received national attention.

Scholarship funds of $1,750 were given to three schools in honor of the first three award winners. All prizes were given for the best designs of machinery and structures stressing the value of arc welded construction.

First award of $1,129 went to Richard Cheverton and Thomas Musslewhite of Georgia Institute of Technology for their joint design of a sub-calibre mount for a recoilless rifle. Army officials have been interested in the design which permits mounting a .22 calibre barrel in a 75 mm rifle for training purpose. In honor of the students, the department of mechanical engineering at Georgia Tech received $1,000 in scholarship funds.

Merle Geoffrion, as an undergraduate in the civil engineering department of the University of Delaware, received the $564 second award for his design for a highway bridge. His department of engineering received in his honor a scholarship fund of $500.

The third award of $282 went to Robert Murray, a student in the department of architecture at Rensselear Polytechnic Institute. His school was given $250 in scholarship funds. Mr. Murray made an analysis to determine the economic span length of standard sections.

The Sixth Annual Competition, now being sponsored, closes on June 23, 1953. All registered undergraduates of engineering schools are eligible to compete. Rules have been simplified this year to avoid conflict with regular school work and time restrictions, says A. F. Davis, secretary of the Lincoln Foundation. Rules are available from the foundation, Cleveland 17, O.

* * *

KSM Products Moves to Bigger Plant

A SUBSTANTIAL increase in demand for KSM solid-fluxed welding studs and stud welding equipment has prompted KSM Products, Inc., to move to a new location on the outskirts of Merchantville, N. J.

New tools in the plant include automatic screw machines and cold-rolled threading machines.

THE MOST PORTABLE GAS-DRIVEN D-C ARC WELDER EVER BUILT!

Sureweld®

Portable on the job... as well as to the job

Two men can lift it with ease

Fits in light truck or station wagon

On-the-job welding, quickly done

Ideal for 'round-the-plant maintenance

Rolls across railroad tracks—or rough terrain

Arc weld anywhere now —with ease, speed

Ideal for Construction, Maintenance and Repair Welding Anywhere

General Construction • Oil Refineries • Railroads • Farms • Public Utilities • Auto Repair Shops Ship Yards • Air Conditioning & Sheet Metal Shops • Public Works • Aviation • Heating & Plumbing • Truck Fleets • Mines & Quarries • Oil Fields • Material Handling • Yard Maintenance

THIS is the only gas driven D-C welder that is light enough and compact enough to go *anywhere.*

One man can move it. Two men can lift it. It can be stowed with ease in a light truck, jeep or station wagon.

Not only can it be taken any place, but it will do a wide range of work and do it well. It can quickly pay for itself by cutting costs on hard-to-get-to welding jobs.

Special design and the extensive use of aluminum makes the Sureweld *light but strong.* Features such as the air-cooled engine, heavy-duty generator, dual-control, armature reactance and governed motor speed result in high performance and long dependable service.

It's Easy to Find Out for Yourself

You can get complete information about the Sureweld Welder from your nearest NCG district office or from the NCG authorized dealer in your city. Or use the coupon at the right to get descriptive literature and prices.

NATIONAL CYLINDER GAS COMPANY

***Executive Offices:* 840 N. Michigan Avenue, Chicago 11, Illinois**

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☐ Please rush Illustrated Bulletin NH-121 containing full details of the SUREWELD Gas-Driven D-C Arc Welder.

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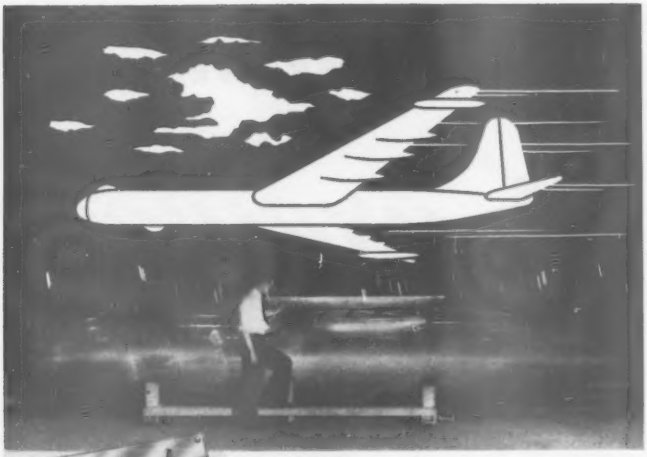


Federal RESISTANCE WELDERS USED IN CONSTRUCTION OF LARGEST KNOWN FUEL TANK

The huge external aircraft fuel tank pictured above is one of a type being produced for the Air Forces by the Ryan Aeronautical Company. Designed by Ryan the tanks are fabricated of aluminum alloys, seam welded to MIL-W-6860 (AN-W-30) on Federal Welders where Ryan is making gas-tight seams without the use of sealing compounds.

Federal Resistance Welding equipment enables Ryan to produce a smoothly streamlined tank that has no external riveting or protuberances to disturb the aerodynamic flow over the skin. Too, resistance welding the tanks eliminates added weight.

High production is another important factor and Ryan, like other aircraft and automotive manufacturers, finds Federal Resistance Welders the most efficient method for producing quality assemblies at high speeds.

The latest Federal Three-Phase Aircraft Spot Welder for welding stainless, aluminum, nickel alloys and carbon steels. If you are interested in Three-Phase Resistance Welding be sure to talk with the Federal Representative in your area. There's a reason why Federal is First in Resistance Welding. Send for your copy of the latest Federal Three-Phase Bulletin.

THE FEDERAL MACHINE & WELDER CO.
WARREN, OHIO

Federal® WELDERS
Warco PRESSES®

Courtesy A. M. Byers

Wrought Iron Piping Carries Welding Gases

ACETYLENE and oxygen from a central supply are brought through wrought iron pipe to the welding station in the Diesel repair of the New York Central railroad in Collinwood, O. Use of wrought iron helps prevent clogging of the pipes, which sometimes occurs in the presence of corrosive chemicals. Existing steam locomotive facilities at Collinwood are being converted to provide for Diesel repairs.

* * *

Tube Turns Buys Kerotest Mfg. Co.

OPERATION of the Kerotest Mfg. Co., Pittsburgh, producer of brass and steel valves for 30 years, has been taken over by its purchaser Tube Turns, Inc., Louisville, Ky. Kerotest will continue to function under its own name and present officers and personnel have been retained.

New officers will be George O. Boomer, chairman of the board, John G. Seiler, vice-president; Robert J. Landolt, vice-president, all of Tube Turns. Walter G. Swaney, incumbent vice-president and secretary and J. D. Isaacks, vice-president of Kerotest remain in the same capacity.

The board of directors will consist of Messrs. Boomer, Seiler, and Landolt of Tube Turns and John D. Dupuis and R. W. Mueller, Sr., of the former Kerotest board.

* * *

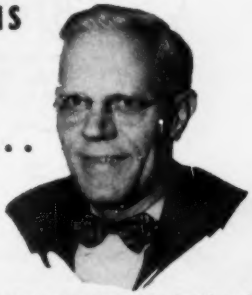
Bridgeport Brass Opens Philadelphia Warehouse

INDUSTRIAL expansion in the middle Atlantic area has caused greater demand for brass and copper mill products, announces Bridgeport Brass Co. on the occasion of the opening of its new Philadelphia warehouse at 918 East Lycoming St. Sales and operations will be in charge of David F. Snow, district sales manager.

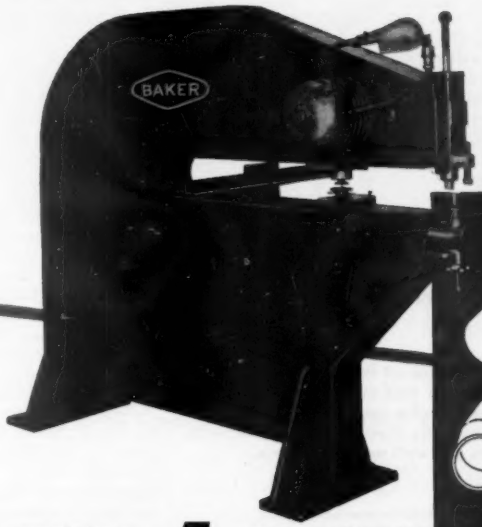
"FOR MANY CUTTING OPERATIONS

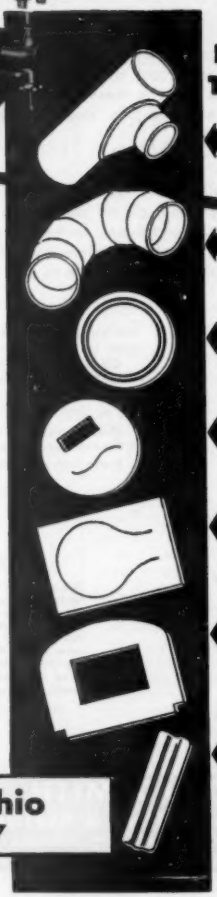
THE **BAKER SHEAR**

MULTIPLIES OUR PRODUCTION RATE"...



Says Mr. Arthur Christen, Vice-President of The Fred Christen & Sons Company, Toledo, Ohio





DOES ALL THESE JOBS

Quantity 3, no template required.

Quantity 85, save time with template—no layout required.

Beading operation, entirely within sheet—compare with other methods.

Inside cuts, no starting hole required.

Inside cut, no metal removed—parts will mate when finished.

This job was cut in 22% of time of previous method.

Custom or low-quantity beading done with low tool cost.

SAVE TIME 5 WAYS!

Do your heavy duty cutting *faster and better* with the Baker Tru-Edge Contour Shear! It reduces operating time to less than ¼ of the time required on previous machines—as shown by actual cases on record because:

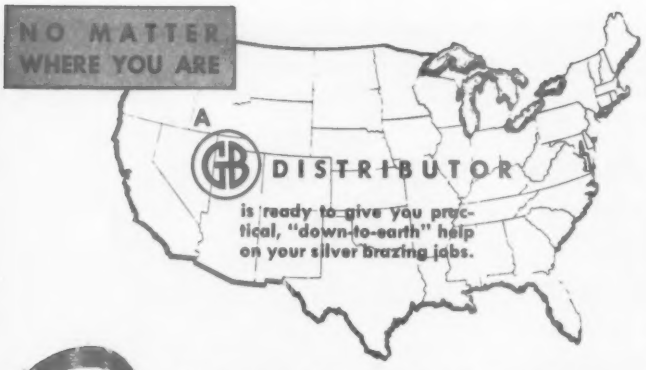
★ FAST CUTTING . . . 10 to 36 ft. per minute.
★ BURR FREE EDGE . . . No finishing required.
★ NO TEMPLATE NEEDED.
★ NO STARTING HOLE for inside cuts.
★ Cuts various thicknesses without adjusting machine.

Capacity: 6 gauge in mild steel, 7 gauge in stainless steel. Simple in design, only 5 moving parts. Versatile—does many jobs with speed and accuracy. Saves labor. Baker-built dependability.

WRITE . . . for illustrated bulletin and price

BAKER BROS., Inc., Toledo, Ohio
Makers of Better Machine Tools . . . Since 1867

The Tru-Edge Contour Shear is made by Baker Bros., Inc., under license from Industrial Devices Corp., Detroit, Mich.



GB's Distributor Sales Organization is made up of experienced salesmen who have a broad background of practical operating experience, as well as technical training, in silver brazing applications. One of those men is in your area—and he wants to work with you to find how GB Silver Brazing Alloys and GB Fluxes will speed up your operations, give you maximum results and save you money.

Each GB standard Silver Brazing Alloy is developed for specific cost and production requirements. They are all available in these easy-to-use forms . . . wire in coils or straight lengths, strips, sheets, simple or intricate formed pieces.

Call in your GB distributor for all the facts about the GB line—he'll gladly supply you with working samples of GB alloys and fluxes, as well as give you helpful assistance on any brazing problems you may have. (If you don't know his location, simply write us and we'll send his address.)

GB FLUXES . . . available in three main types to cover the low temperature silver brazing range:
GB No. 99—working range up to 1350° F
GB No. 88—working range up to 1650° F
GB No. 27—working range up to 2000° F

GB FLUXES . . .
Dissolve metallic oxides readily
Provide uniform flow of silver brazing alloy
Insure high joint strength

GB FLUXES

The physical properties and appearance of a brazed joint are controlled to a large degree by the flux which is used. For this reason it will pay you to team-up GB Flux with GB Silver Solder—they were developed to produce maximum results when used together.

GOLDSMITH BROS.
SMELTING & REFINING CO.
1300 W. 59th CHICAGO, ILL.
Suppliers of Precious Metals to Industry Since 1867

Princeton Men Win Eutectic $500 Prize

SIDNEY Shore, assistant professor and E. W. Rothfuss, Jr., graduate student, both of the civil engineering department at Princeton University, shared the first prize of $500 in the international prize competition recently conducted by Eutectic Welding Alloys Corp., Flushing, N. Y. Contest papers were written on the general subject, "Technological and Research Aspects, Advances and Advantages of the Use of Lower Melting Filler Metals in the Non-Fusion Welding Process." Messrs. Shore and Rothfuss' paper was in Category A on welding engineering and theory.

Winner of the $300 second prize in this category was H. Edward Flanders of the University of Utah. Third prize of $200 went to Paul Broadstone and Fred Salmons of the R. G. LeTourneau Corp., Longview, Tex.

Category B consisted of papers on practical welding applications and the first prize here for a three-way tie resulted in $100 awards for each of three men. They are F. DiFrancesco, weldor for an ice cream machine fabricator in the Bronx; Everett Ayers, Safety Motor Transit Corp., Roanoke, Va., and Fred W. Hellings, Henry Disston & Sons, Inc., Philadelphia. There were 22 other winners in this division, including men from Italy, Austria, England and Chile.

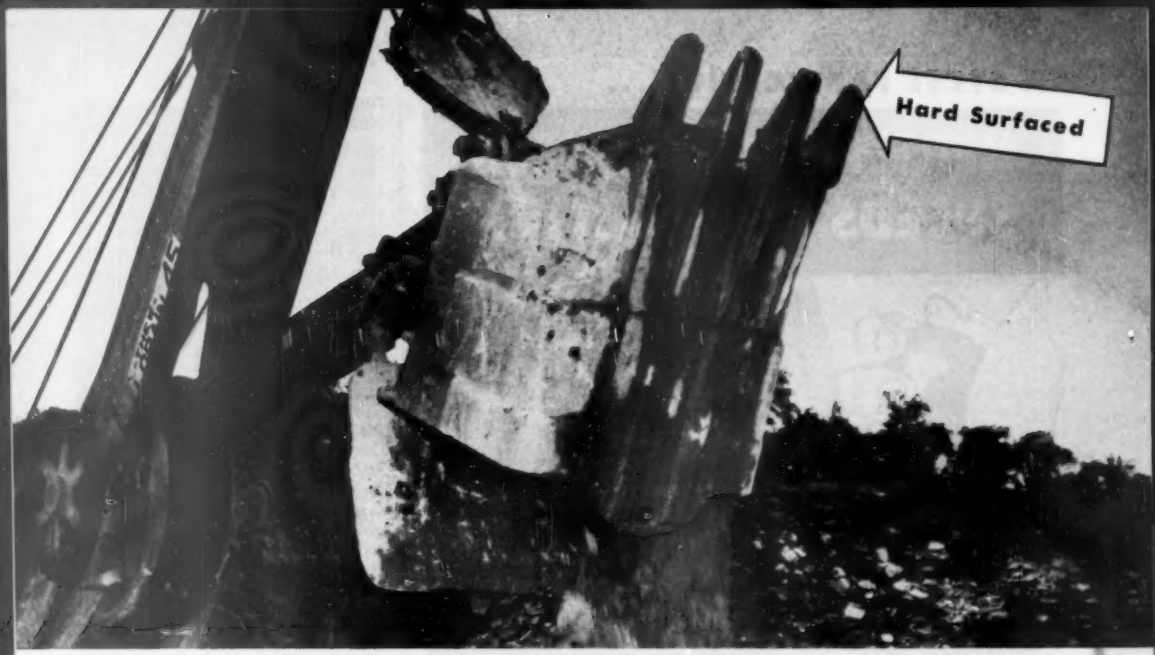
Next year's contest will have a total of $3,000 in cash awards, the extra $1,000 being put up for the practical welding category. According to Rene D. Wasserman, Eutectic's president, winners in this division come almost wholly from industry and it is worthwhile to stimulate welding ideas from this source as well as the educational institutions.

* * *

Aluminum Reduction Pots Enlarged by Welding

WITH no change in the external appearance of its plant at Longview, Wash., the Reynolds Metals Co. has increased its capacity from 60,000,000 to 100,000,000 lb of pig aluminum per year. This 67% increase was accomplished by enlarging by welding the installation's 372 reduction "pots"—electrolytic cells where alumina becomes metallic aluminum.

The pot structures were trucked individually to a Swan Island, Washington, firm for fabrication. There they were rebuilt by cutting them in two and expanding them by welding in joining sections. They were then returned and installed in the original buildings.



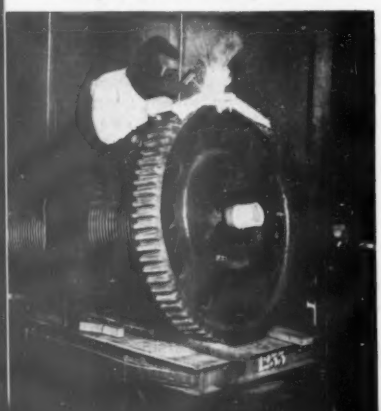
SHOVEL TEETH CAN BE HARDSURFACED TIME AFTER TIME, CUTTING REPLACEMENT COSTS TO A BARE MINIMUM

Get More Welding Business from Jobs Like These

G-E Hardsurfacing Electrodes Can Multiply the Life of Wearing Parts at a Fraction of Replacement Cost

Don't let your customers scrap grinding, crushing, and scraping equipment without a careful second thought. Dipper teeth, spiral-feed screws, gears, sprockets, shovels, and other equipment with wearing parts can give extra service when built up with G-E hardfacing electrodes. In most cases, hardfaced edges outlast the original metal!

REPAIR COST is only a fraction of total replacement, when broken gear teeth are built up with G-E hardfacing.



The following chart will help you choose the proper G-E electrode for the job, according to the type of wear.

EQUIPMENT APPLICATION	TYPE WEAR	G-E HARD-FACING ELECTRODE
Moving sand & dry soils	ABRASION & impact	G-E W-95
Handling sand, gravel, and small stones	ABRASION & impact	G-E W-93
Moving larger stones	IMPACT & abrasion	G-E W-94 & G-E W-96
Rock crushers, dipper teeth, tractor grousers	IMPACT & abrasion	G-E W-94 & G-E W-96
Railroad frogs & switches	IMPACT & abrasion	G-E W-97
Food, chemical handling equip.	CORROSION & abrasion	G-E W-97

NOTE: G.E. also manufactures lightly-coated hardfacing electrodes, and electrodes that give a flame-hardenable deposit.

For complete information on how you can increase the life of heavy equipment, see your nearest authorized General Electric Welding Distributor. He also carries a complete line of other G-E electrodes, accessories, and welding equipment.

You can find his name by looking in the classified section of your telephone book. Look for General Electric under "Welding." It will pay you to see him!

JUST OUT!

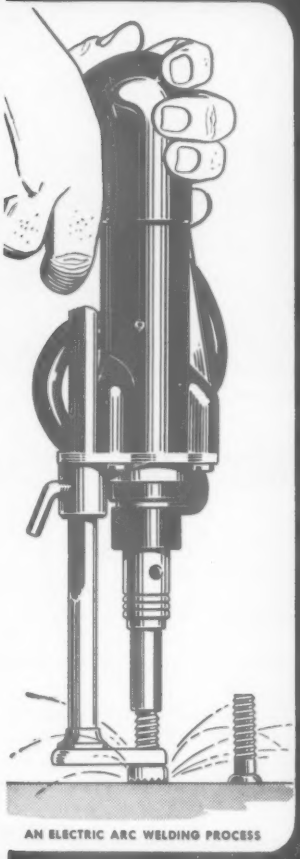
Get your copy of this new and complete pocket electrode manual. The booklet includes information on all types of G-E electrodes, a trouble-shooting chart for electrodes and equipment, and data on American Welding Society nomenclature. It is available *only* from your authorized G-E Welding Distributor. General Electric Company, Schenectady 5, N. Y.

712-18

GENERAL ELECTRIC

IN STEEL FABRICATION...

HERE'S HOW NELWELD SPEEDS PRODUCTION



AN ELECTRIC ARC WELDING PROCESS

END-WELDS STUDS TO STEEL IN A SPLIT-SECOND

ELIMINATES DRILLING, TAPPING, HAND WELDING

REDUCES MATERIAL HANDLING—TAKES THE TOOL TO THE WORK

NELWELD

SAVES STEEL—ELIMINATES HEAVY BOSSES AND FLANGES

IMPROVES PRODUCT DESIGN AND QUALITY

A NELWELD CLINIC CAN SHOW YOU—

right in your own plant, how you can benefit from this modern fastening method.

Write today for the Nelweld Clinic brochure to Lorain, Ohio.

Fasten it Better...at Less Cost, with NELWELD

NELSON STUD WELDING

DIVISION OF GREGORY INDUSTRIES, INC., LORAIN, OHIO

Stoody Appoints New Distributors

NEW appointments of distributors in various parts of the country have been announced by the Stoody Company, Whittier, Calif. Some of these firms had handled Stoody products as dealers before the present appointment. They are: Balaam-Raymond, Welding Supplies, 1421 Park Ave., Emeryville, Calif.; Harry T. Hanover, 411 Brennan St., San Francisco; H. M. Parker & Son, 230 South Central Ave., Glendale, Calif.; Harris Sales & Service Co., 4 East Grand Ave., New Haven, Conn.; R and R Welding Supply Co., 315 Twelfth St., Des Moines, Ia.; Jackson Welding Supply Co., 204 Homewild Ave., Jackson, Mich.; Robinson Welding Supply Co., 8706 Lyndon Ave., Detroit; Tupes of Saginaw, Inc., 402 Davenport St., Saginaw, Mich.; Tupes Spring & Welding Service, 535 Peck St., Muskegon Heights, Mich.

In Montana is the General Distributing Co., 427 Tenth Ave., South, in Great Falls. Others in the west are E. Cosgrove, Inc., Silver City, New Mex.; Western Oxygen Co., 211 West Marland St., Hobbs, New Mex.; Wear-Weld Products Co., 2324 N.E. 82nd Ave., Portland, Ore. On the east coast are National Welding, 805 Taber St., Ithaca, N. Y.; Eastern Distributors, Inc., 800 South John, Goldsboro, N. C.; Merritt-Holland Supply Co., Inc., 201 Red Cross in Wilmington, N. C.; Hampton Roads Welders Supply Co., 614 West 25th St., Norfolk, Va.; The Milliken Co., 1313 Williamson Road, Roanoke, Va.; Welders Supply Corp., 1548 East Cary St., Richmond, Va.; Bashlor-Sowers Welding Service, Inc., 110 Spruce St., Bluefield, West Va.; Virginia Welding Supply Co., 116 Virginia St., East, Charleston, West Va.

Three distributors in Texas were named: Beaumont Oxygen Co., 955 South Fourth St., Beaumont; Welders Supply Co., 2607 Avenue H., Lubbock and Western Welding Supply, Snyder, Tex.

North-central suppliers named were Anderson Welding Supply Co., 1414 Sixth Ave., S. W., Aberdeen, South Dakota; Dakota Welding Supply Co., Inc., Watertown, South Dakota; Evensen Welding Supply, 17 Central Avenue East, Minot, North Dakota.

• • •

Scott-Tarbell Takes On Silver Brazing Line

SCOTT-Tarbell, Inc., Cleveland 15, will carry a complete stock of Goldsmith Bros. silver solder and brazing fluxes in both the Cleveland and Cincinnati warehouses.

Lincoln Welding School Gives 35th Years' Service

MARKING the 35th anniversary of the Lincoln School of Welding, a new bulletin has just been published by The Lincoln Electric Co., Cleveland 17. It tells about the school, the various courses given and the educational facilities.

Head of the welding school is Art Madson, said to know more weldors than any other man in the world. During his 25 years at the helm of the school, he has graduated 35,000 men and women weldors from 19 different countries, including India and South Africa.

The school was started in 1917 when the United States Army purchased some welding equipment from Lincoln and specified in the contract that Lincoln train soldiers to be weldors. Since that time the school has been turning out weldors averaging better than 1,000 a year. During World War II it operated 24 hours a day with 4 separate classes each day.

Basic course at the Lincoln school consists of 4 weeks' training and practice with a new class starting every week. The school is conducted as a service to industry and only a nominal charge for materials is made. Advanced courses in special welding techniques are also available.

* * *

Welding Ignitron Maker Licensed at Geneva, Ill.

NATIONAL Electronics, Inc., Geneva, Ill., has been licensed by General Electric Co. and Westinghouse Electric Corp. to make ignitron tubes for resistance welding controls. Working under the G-E and Westinghouse ignitron patents, National is now producing three types of water-cooled and air-cooled tubes. Two additional types are now in development and are to be announced this winter, according to John H. Hutchings, engineering vice-president.

an ACCO product for Stainless Steel WELDING

AC-DC Electrodes

GAS Welding Rods

made by PAGE

BURNING...
stable even at lower heats

SLAG...
clean, easily removed

COATING...
resists cracking down to very short stubs

SELECTION...
complete line for welding every type of stainless

Get in touch with your PAGE distributor

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PAGE STEEL AND WIRE DIVISION
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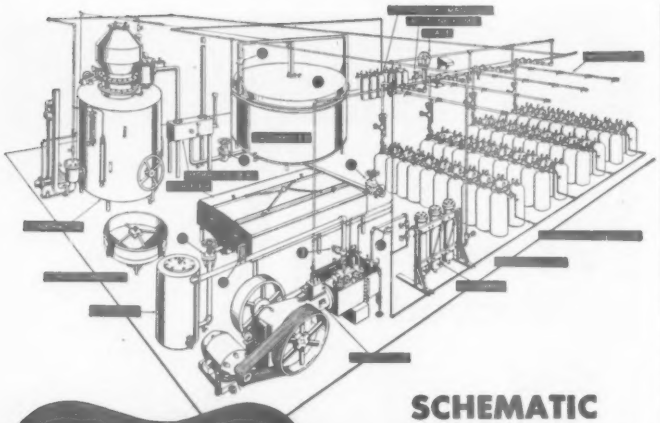
PAGE Welding Electrodes AND Rods



A *Low Pressure*
ACETYLENE
PRODUCING
PLANT
that Charges up to
160 CYLINDERS
at ONE TIME

SCHEMATIC PLANT ASSEMBLY

SHOWING LOCATION OF UNITS THAT MAKE UP THE PLANT

This plant layout provides simplest operation at low production costs. Compact design allows operator to watch all operations at all times.

LOW PRESSURE

GENERATOR

This 600-lb. acetylene generator fits into the above plant assembly. It stands out as one of the safest plants manufactured. Automatic controls minimize operating personnel. Rated capacity of the generator and plant assembly is 2700 cu. ft. per hour. The other units are designed for maximum production at minimum costs.

WE INVITE YOUR INQUIRIES

INDEPENDENT ENGINEERING COMPANY, Inc.
Manufacturers of
CONSULTING · DESIGNING · RESEARCH
CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN
O'FALLON 5, ILLINOIS

Steel Output Rises in Latin America

IN 1951, Latin American countries produced a record 1,600,000 tons of steel according to the American Iron and Steel Institute. This output was stimulated in part by expansion programs which are scheduled to almost double production. One Latin American country, Peru, will join its seven sister steelmaking nations in the near future also. She has contracted for a plant at Chimbote, with an electric furnace, two reduction furnaces, a steel plant and rolling mills.

Mexico's fast-growing steel industry produced 390,000 tons of steel ingots and 350,000 tons of pig iron in 1951. Plants are located at Piedras Negras, Monclova, Monterey and Mexico City.

Of the seven South American countries now producing steel, Brazil has by far the largest capacity. The steelmaking furnaces at the Volta Redonda plant outproduce all others in South America. Both Brazil and Chile produce iron for steelmaking, enabling Brazil to turn out 900,000 tons of steel ingots last year, and Chile about 200,000 tons.

Argentina has modern steel furnaces located at Rosaio and Villa Constitution operating on molten metal from cupolas and cold scrap. Colombia, Uruguay and Venezuela have electric furnaces which melt scrap. In Colombia, about 110 miles northeast of Bogota, an integrated steel plant capable of producing 100,000 tons of steel annually is scheduled for completion in the summer of 1953. Colombia has enough ore to start operation, and is one of the few South American countries with known reserves of good quality coking coal. Venezuela has a steel plant at Caracas and is interested in the construction of a steel plant near the rich iron ore deposits now being developed there.

* * *

Babcock & Wilcox Buys Georgia Boiler Plant

THE Babcock & Wilcox Co. has purchased a former shipyard from the Brunswick Port Authority at Brunswick, Ga., and will convert it to a boiler plant. The property consists of about 110 acres with about 250,000 sq ft under roof.

Production is expected to start about the first of the year and build up to an employment of 400 by mid-1953. This is the fourth new plant to be announced by B&W in the past year, bringing the total to 10 altogether.

* * *

I never think of the future. It comes soon enough.—Albert Einstein

Black, Sivalls & Bryson Completes 60th Year

MORE than 60 years of tank making is the record just hung up by Black, Sivalls & Bryson, Inc., Kansas City, Mo. The firm started in Ohio in 1892 making wood tanks for oil storage. Today BS&B comprises six manufacturing plants, 52 branches and sales offices and employs over 2,500 people in an international business.

Primarily a fabricator of oil and gas field processing equipment, the firm has in recent years expanded its activities into many other fields—chemical, petro-chemical, power, l-p gas, agricultural, air-conditioning, aircraft, foundry and others.

A $2,000,000 expansion of plant facilities is just about finished and includes major enlarging of the Kansas City and Oklahoma City plants. Some 57,000 sq ft of added manufacturing area was built at Oklahoma City, including a new 600 by 80 ft heavy-pressure vessel welding bay. Equipment installed includes a heavy plate oven and one of the largest stress-relieving furnaces in the country.

About 73,000 sq ft of manufacturing and storage space have been added at the Kansas City plant, including a new machine shop bay, enlarged heat-treating facilities and new shop offices.

* * *

Titanium Status Reviewed at Watertown Arsenal

ALREADY saving weight in strategic spots in warplanes, the new structural metal titanium is undergoing broaden its application. This report intensive study by producers to was made by William C. Beck, engineer, Mallory-Sharon Titanium Corp., in a talk given at the Watertown Arsenal, Watertown, Mass.

About 1,000 present and potential government suppliers were in attendance at Mr. Beck's talk. They had gathered at the behest of the Dept. of Defense to receive the latest briefing on the new metal. Among advances mentioned were increases in size of maximum ingots and better scrap utilization. Mr. Beck advised all companies to keep in close touch with titanium welding, machining and forming progress.

Mallory-Sharon Titanium Corp., Niles, O., is jointly owned by P. R. Mallory Co., Indianapolis, and the Sharon Steel Corp.

Make Quicker, Easier, Stronger Repairs with Bridgeport's No. 192 Low Fuming Bronze Rod

Braze-welding helps you get cracked or broken equipment back into service quickly. For example, this motor gear reduction frame housing was repaired with a minimum of delay with Bridgeport's No. 192 Low Fuming Bronze Rod. Much time and expense were saved, because it was not necessary to build an elaborate set-up for general preheating and slow cooling. The local area of the braze had only to be prepared and heated to a cherry red.

In many cases, braze-welding repairs can be made without dismantling the equipment. Strong lasting welds are made by this method. In fact, they are often stronger than the original metal because of the absence of brittleness.

Bridgeport braze-welding alloys are also extremely useful for building up worn surfaces, repairing broken castings, and for regular production work. Complete information is available in Bridgeport's booklet, "Bronze Welding Alloys." Write for your copy today.

"Bridgeport" BRASS CO.

BRIDGEPORT BRASS COMPANY
Bridgeport 2, Conn. Established 1865
Mills at Bridgeport, Conn., and Indianapolis, Ind.
In Canada: Noranda Copper and Brass Limited, Montreal

Bronze Welding Rod A PRODUCT OF BRIDGEPORT BRASS

Colmonoy No. 1 Hard-Facing Outwears Manganese Steel

Tough manganese steel is used to make parts that must really take rough use. When these parts wear beyond usability, they are often rebuilt with nickel manganese steel alloy. This has been a good practice to give worn parts a new service life equal to their original life.

It is a much better practice, however, to give worn manganese steel parts 2½ to 3 times their original service life by using nickel manganese plus hard-facing with Colmonoy No. 1 electrodes. While manganese steel has good impact resistance, it doesn't compare with Colmonoy No. 1 in resisting abrasion, and abrasion always accompanies impact.

With shock absorbing manganese steel as the "core" of the part, and abrasion resistant Colmonoy No. 1 as the protective "case" of the part, a maximum service life is assured users of manganese steel equipment.

Colmonoy No. 1 is used extensively on carbon steel parts as well. It is a low priced electrode that is easy to apply. Any weldor can put it on. Let us send you our descriptive pamphlet No. 102, and our Engineering Data Sheet No. 23.

Colmonoy stands for a complete line of hard-facing alloys. Each alloy is resistant to a certain combination of abrasion, corrosion, impact, and heat. Colmonoy alloys come in various forms to suit different applications: oxy-acetylene rods, electrodes, paste, powder, wire, and castings.

Colmonoy Hard-Facing Manual

This new manual will make good hard-facing easier for you to do. It gives the characteristics of all Colmonoy alloys, typical jobs on which they are used (in every industry), full information on the Sprayweld Process, castings, finishing methods, etc. The manual was printed for you . . . write for yours today.

HARD-FACING ALLOYS

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CORPORATION

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NWSA Central Meeting Scores Big Success

SIZE and quality of the central zone meeting of the National Welding Supply Association in Milwaukee, Sept. 17-18, gives a high mark for the other zones to shoot at this year. With 129 members and guests registered, it was the largest zone meeeting ever held by NWSA.

James Alcock, zone vice-president, who heads Saginaw Welding Supply, Saginaw, Mich., opened the meeting with a personal welcome. He introduced Robert C. Fernley, NWSA secretary, who gave an outline of NWSA activity. G. Milton Sims, president of Absco Welding Supply, Los Angeles, and national president of NWSA brought "greetings from a fellow distributor on the West coast."

Modern welding-display practice was next shown the delegates in a special slide film. Many up-to-date stores of NWSA members were pictured. How good stocking and display contribute to increased, more efficient sales were also discussed

A. von Wening, vice-president, A. O. Smith Corp., spoke after lunch on the subject, "Looking Ahead in the Welding Industry and the Role to Be Played by Welding Supply Distributors. Second paper of the afternoon was given by Pat S. Doyen, field engineer for Welding Equipment & Supply Co., Detroit. Though a technical presentation of the merits of low-hydrogen electrodes, it was extremely interesting and excited a number of questions and discussions. Interest also ran high in the talk given by Ray C. Koltes, Red Arrow Sales Corp., Madison, Wis., who discussed the importance of proper safety measures in welding.

Leasing versus owning of trucks and rolling stock was ably discussed by E. C. Caluwaert, O.K.I. Welding Supply Co., Cincinnati, in an outstanding research report. This led to many comments with a divergency of views expressed by many listeners. Last event of the afternoon was a general discussion led by William Rice, Virginia Welding Supply Co., Charleston, W. Va., on the standardization of catalog sheets. An informal reception and cocktail party was held for delegates from 5 to 7 p.m.

Plant visits to A. O. Smith, the Miller Brewing Co. and Ampco Metals, Inc., made up the second day's program. Some 73 members and guests were in attendance on the A. O. Smith tour where they saw electrodes being manufactured and used to weld pressure vessels and auto frames. A highlight of the plant visitation at A. O. Smith was a 15-min-

ute stop at the metallurgical research department where each visitor was given the degree of "Occasional Metallurgist" together with a complete set of metallurgical testing tools.

A big event was the visit to the Miller Brewing Co. While everyone was interested in the brewery apparatus they were even more absorbed in a careful sampling of the product manufactured. Adding to the tastiness of the beer was an excellent buffet luncheon served with the compliments of Miller.

Thursday afternoon the NWSA group went through Ampco Metals, Inc., where it saw a variety of copper alloys being cast and extruded. The men also got a firsthand view of the manufacturing of resistance welding electrodes, arc welding electrodes and safety tools.

Three new members were accepted at this top-notch zone meeting: Essex Welding Supply Ltd., Windsor, Ont., Canada; Vern Miller Welding Supply, Milwaukee and Wolfenden Welding Supply, Inc., Cleveland.

* * *

Philadelphia AWS Men Sponsor Welding Classes

A SPECIAL service to industry in the Philadelphia area this fall is an evening welding college for foremen, technicians and supervisors sponsored by the Philadelphia section of the American Welding Society. Titled "Principles of Welding Engineering," the series is handled by Drexel Institute of Technology.

Metallurgy, design, inspection, welding processes and codes and specifications are covered in the classes—the first of which began Sept. 24. Hours are from 7 to 9:40 p.m. one evening per week for a total of 12 weeks. For those men who complete the first 12-week course, there is a second 12-week session available, beginning Dec. 10. Fee for each course is $30.

Kick-off for the program was the Sept. 15 Philadelphia AWS meeting, held at Drexel auditorium. Featured speaker of the evening was T. B. Jefferson, editor of THE WELDING ENGINEER. Prof. Grosvenor conducted an inspection tour of the school's new metallurgical laboratory before the meeting.

* * *

Lindberg To Build Furnaces in Los Angeles

LINDBERG Engineering Co., Chicago, has purchased 4½ acres of land adjoining the Southern Pacific tracks in Los Angeles on which to build a furnace plant. Both heat-treating and melting models will be made there.

PERFECT WELDS
every time

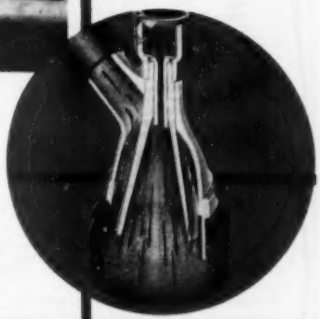
28 GAUGE TO 2 INCH PLATE OR SHAPES

Successful applications include shipbuilding, manufacture of pipe, pressure vessels, drums and pails, and fabrication of steel structures. Either as a portable or fixed unit, Vacu-Blast cleans top, bottom and edge simultaneously to a bright, dustfree finish right ahead of welding. There's no rust or scale to contaminate the weld.

On critical welds that require pressure testing or radiographic inspection, Vacu-Blast precleaning has eliminated over 80% of former rejects. In the welding of pipe, pressure vessels, drums and pails, Vacu-Blast drastically reduces leakage.

PROOF OF A JOB WELL DONE

These radiographs show the difference between welds preceded by Vacu-Blasting and those using less effective cleaning methods.



HOW THE VACU-BLASTER WORKS

In effect it is a miniature blast cabinet enclosed in a brush. Steel grit blast cleans the surface with a thoroughness unequaled by any other method. A vacuum return picks up all abrasive, dust and dirt. None scatters about your plant. All abrasive is reclaimed for reuse time and again.

VACU-BLAST CO. INC.

Please send specific detail information applying to the _____ business.

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Signed _____

Write for free booklet

AMPCO-TRODE*
Hard-grade Electrodes

The fight against costly wear is a never-ending struggle. But a great many are winning the battle with these four Ampco-Trode hard-surfacing aluminum bronze electrodes.

1. **Ampco-Trode 160** — for repair or fabrication overlays on bearing surfaces subject to shock, impact, and wear. Brinell hardness . . . 160 average.
2. **Ampco-Trode 200** — for repairs and maintenance or fabrication overlays on machine parts subject to unusually severe service. Brinell hardness . . . 200 average.
3. **Ampco-Trode 250** — for overlays on bearing or wearing surfaces working against hardened steel under pressure. Brinell hardness . . . 250 average.
4. **Ampco-Trode 300** — for overlays on forming and drawing dies and other metal-to-metal wear surfaces. Eliminates scratching and galling of the work. Brinell hardness . . . 300 average.

These are four low-cost ways to beat wear. Keep a supply of these electrodes on hand. Then you can choose the right rod for your needs. For further information, consult your Ampco distributor or write us.

AMPCO

W-119

AMPCO METAL, INC.
MILWAUKEE 46, WISCONSIN
West Coast Plant: Burbank, California

IT'S PRODUCTION-WISE TO AMPCO-IZE!

*Reg. U. S. Pat. Off.

W-119A

AWS-ASTM Publish Copper Filler Metal Specs

LATEST specifications for copper and copper-alloy welding filler metal have been jointly issued by the American Welding Society and American Society for Testing Materials. They cover welding rods for use with oxy-acetylene, carbon arc and inert-gas metal-arc (nonconsumable electrode). AWS designation is A5.7—ASTM designation is B 259.

The 12 classifications established by these specifications include copper, silicon bronze, phosphor bronze, copper-nickel, naval brass, manganese bronze, low-fuming bronze, nickel bronze and aluminum bronze welding rods. The new specifications specify the chemical composition, mechanical properties and usability characteristics of each composition and the tests for verifying these properties.

Copies of the *Specifications for Copper and Copper-Alloy Welding Rods* can be purchased for 40c each from either the AWS at 33 West 39th St., New York City 18, or the ASTM at 1916 Race St., Philadelphia 3.

* * *

Rensselaer Welding Men Win RWMA Prizes Again

FIRST and second prizes in the annual prize paper competition of the Resistance Welder Manufacturers Association have been copped for the second straight year by members of the metallurgical engineering department at Rensselaer Polytechnic Institute, Troy, N. Y.

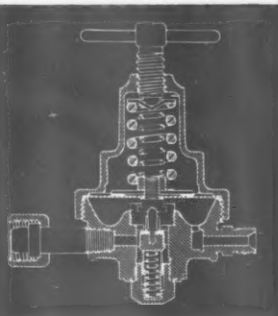
A first prize of $300 and a second prize of $200 will be awarded to the winners. The winning paper was titled "Temperature Distribution during Flash Welding of Steel" and was written by Dr. Ernest F. Nippes, associate professor, Warren F. Savage, assistant professor, John J. McCarthy, instructor and Sheridan M. Smith, former research associate now employed by National Cylinder Gas Co., Chicago.

The second prize paper was titled "Projection Welding of Steel in Heavy Gages and Dissimilar Thicknesses," and was the work of Dr. Nippes and John M. Gerken, research associate. The prizes will be awarded at the annual meeting of the AWS in Philadelphia during the week of October 19.

* * *

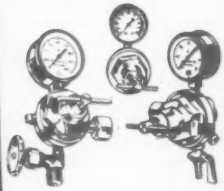
No man is good enough to govern another man without that other's consent.—Abraham Lincoln

DEPEND ON DURABLE DOCKSON REGULATORS



in types for Oxygen, Acetylene, CO_2, Air, Fuel Gases.

"BUILT FOR BETTER SERVICE" with improved diaphragms, replaceable, self-aligning seats; sturdier construction; shatter-safe gauges; alert safety valves and other advantages.



THERE IS A DOCKSON DISTRIBUTOR NEAR YOU—Let us send you his name and our complete catalog of DOCKSON WELDING and CUTTING EQUIPMENT.

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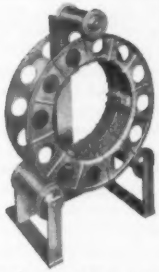
NOW

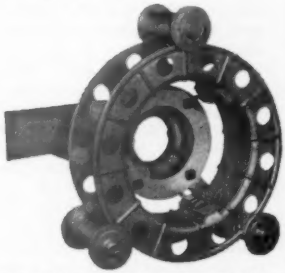
Double and Triple weight coils for automatic welding with the new REID-AVERY (free wheeling) REELS for Submerged Arc, Open Arc, and Gas Shielded Arc Welding



Raco Reel for 150-200# coils with floor mounting stand.

Decrease down-time by using larger coils. Machines now equipped for 25 lb. coils can use up to 75 lb. coils with these new reels.

These cast aluminum alloy reels ride on ball-bearing trunnions with deep flanges. The wire uncoils with remarkable ease and yet there is no chance of overrunning and throwing loops over the side. No brakes or drags of any kind are necessary. The wire itself prevents overrun. These "free wheeling" reels provide the absolute minimum load on the automatic welding machine.



Raco Reel for 25#-50#-75# coils. Mounted on popular submerged arc machine.

The Reid-Avery reels are available with stands for floor mounting or with special spiders for direct attachment to most popular automatic welding machines. Three reels 12" ID x 4" wide, 14" ID x 6" wide, and 25" ID x 4" wide nominal size are in stock for prompt delivery.

Raco Reel shown split for loading.

Note the simple split reel construction with suitcase type latches. Coils can be replaced in seconds and no wrenches or special tools are required.

We are equipped to supply all sizes of layer wound coils for these reels, for other reels, or on expendable wooden spools where required.

The REID-AVERY COMPANY
INCORPORATED
DUNDALK • BALTIMORE 22 • MARYLAND
SINCE 1919 PRODUCERS OF ARC WELDING ELECTRODES AND WELDING RODS

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Carbide
EFFICIENT
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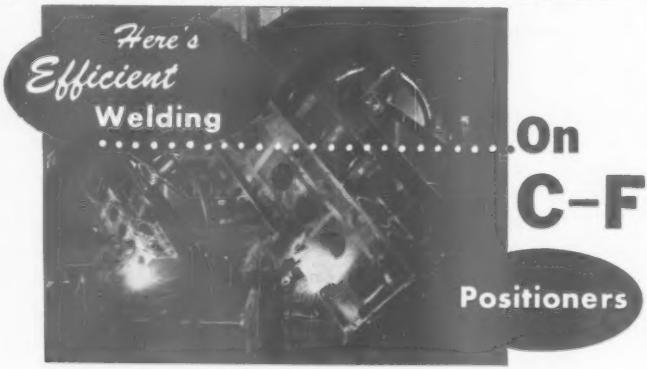

When heavy, unwieldly weldments like these diesel crank cases can be quickly swung into any position so that every weld is made **downhand**—that's efficient welding!

Weldors spend more time welding—do better welding at lower cost when they work with C-F Positioners because these hand and/or power operated machines reduce positioning time to a minimum. Investigate the cost-saving advantages of C-F Positioners. They pay their way in any company.

Write for Bulletin WP24—an illustrated circular detailing the **Specific** advantages of C-F Positioners.

Cullen-Friestedt Co, 1309 S. Kilbourn Ave.

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

C-F
positioned welds
mean better, more
economical welds

California Boy Wins Top Farm Welding Award

THE FIRST award of $600 in the second annual competition of the $7,000 Farm Welding Award Program for High Schools went to Marvin F. Ormonde, San Luis Obispo, Calif. The awards are sponsored by the Lincoln Arc Welding Foundation, Cleveland.

Marvin's award was made for his descriptions of a livestock rack for a truck and a bulldozer frame and scraper blade, both of which were welded as a school and home project. Other prizes and honors went to 105 boys in 23 different states.

Sharing the honors and awards of the top ten winners were their high schools and farm-mechanics teachers. Mr. Ormonde's school, the Arroyo Grande Union High School, received $600 and his instructor, Herbert Brownlee, was presented a certificate. Second award of $400 went to Donald Moore, Copeland, Kansas, who described a home-made feeding system for handling silage for cattle. The Copeland Rural High School and his teacher, Will M. Seacat, were honored with an equal cash award and certificate.

Third awards of $200 each were given Billy Ray James of Clay Center, Kansas, and Martin Gundrum, Theresa, Wis. They wrote about, respectively, an all-purpose cattle squeeze and a self-propelled hay and corn chopper. Their high schools, Clay County Community High School and Mayville High School were equally awarded. Ray Morrison, teacher at Clay Center, had 5 successful students in the program. Instructor at Mayville High School is Andrew Magyar.

Purpose of this series of award programs, sponsored annually by the Lincoln Foundation is to encourage farm boys to use arc welding in farm operation and maintenance.

Savings of $500 a year are possible for the average farmer if he does his own repairs, report the deans and professors of 20 agricultural colleges. As much as $2,000 can be gained by saving crops in emergencies, shows the report.

One of every four farms in this country could profitably use welding equipment to make labor-saving farm machinery, it was found. A new Farm Welding Award program is now open to all high school students who live on farms or ranches. Closing date of the contest is June 15, 1953. Rules are available from the Lincoln Foundation, Cleveland 17, O.

* * *

To obtain additional information on any advertised products, use the cards on pages 17-18.

Photo courtesy Detroit Stamping Co.

Welded Clamping Fixture Pressure Tests Tubing

TUBING shapes for the automotive and aircraft industries are usually tested by air pressure. Submerged in a water tank, any leaks in the tube shows up readily. Heretofore it's been a slow process, though, to mount the tube securely, submerge it and unfasten it afterwards.

A new fixture designed by the J. N. Fauver Co., Inc., Detroit, utilizes five special toggle clamps, a welded tank assembly and air pressure shut-off valve to speed testing considerably. The flexible tubing is held in place with holding bars fitted with rubber shut-off seals. Bolts secure the holding bars to the clamps. A different style plunger-type clamp raises and lowers the testing fixture in the tank. The tubing is tested under plant line pressure ranging from 40 to 160 lb.

* * *

Ceramic Coatings Prevent Carbon Absorption

SOME stainless steels used in aircraft exhaust systems tend to absorb carbon under severe operating conditions. This causes precipitation of carbides at or near grain boundaries, which may result in failure of parts.

Protecting the surface of stainless with special ceramic coatings seems to prevent this carbon absorption, says the National Bureau of Standards. Investigated were several NBS ceramic coatings applied to three stainless steels, types 304, 321 and 347. Coated and uncoated specimens of the alloys were subjected to strongly carburizing conditions at 1,350, 1,500 and 1,650 F. The study was conducted by J. W. Pitts and D. G. Moore of the NBS enameled metals laboratory.

* * *

Pittsburgh AWS Section Visits Dravo Shipyard

MORE than 100 members of the Pittsburgh section of the American Welding Society attended a luncheon meeting on September 26 at Dravo Corporation's Neville Island shipyard and plant.

B. H. Aircraft Co., Inc.
Farmingdale, N. Y.

SAVES 86% IN CLEANING TIME

Wheelabrator's fast thorough cleaning action scours metal surfaces brilliantly clean in but a few minutes — to save hours of cleaning time and cut costs to a minimum. That's the story at the B. H. Aircraft Company and everywhere else that Wheelabrator is used. Mr. Donald F. Baum, Vice-President, puts it this way:

"We are currently using the Wheelabrator for cleaning of all details prior to the spot welding and/or silver brazing of these details on our pipe assemblies. These details are made from .032 low carbon and .065 nickel-chrommoly steel and range up to 4" x 4" in size. The average time for cleaning is about 14% of the time for sand blasting. Sub assembly bodies are now Wheelabrated in 70% of the time formerly required."

See for yourself how this high speed blast cleaning can help you reduce your costs and improve the appearance of your products. Ask for a test demonstration without obligation. *Write today for details.*

Installation of the above Wheelabrator Tumblast saved 86% in cleaning time on pipe assemblies.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

WAGNER ·· Pioneers

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QUALITY ELECTRODE HOLDERS

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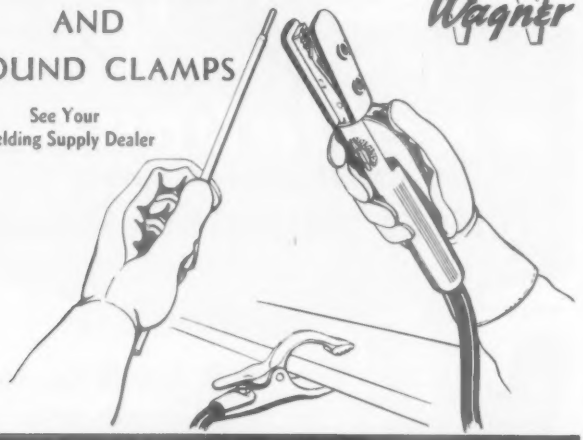
GROUND CLAMPS

See Your
Welding Supply Dealer



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THE ORIGINAL CHAMPION
EYEGARDS
with 10-way ventilation
BEST THING NEXT TO YOUR EYES

The protection of your workers' eyes can be achieved surely and at big savings with Eyegard Goggles. Highest in quality and comfort, they feature: impact-resistance... super-lightweight... 10-way ventilation through 3 vents at side of cup and 7 vents around lenses. Write for free catalog today.

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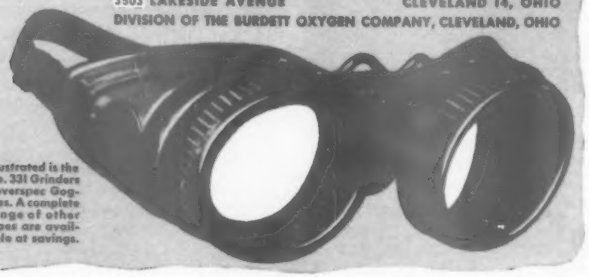
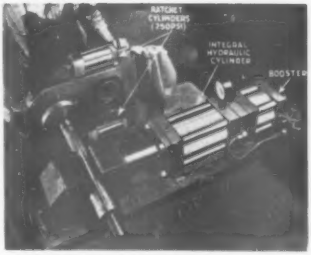
DIVISION OF THE BURDETT OXYGEN COMPANY, CLEVELAND, OHIO



Illustrated is the No. 331 Grinders Coverspec Goggles. A complete range of other types are available at savings.



Hydraulic Clamp Squeeze Measures 15 Tons

A SPECIAL bench-type clamp holds polished chrome-plate piston rods with 15 tons pressure to permit fast assembly of piston and followers. The clamp was built by Planet Products Corp., Cincinnati, in conjunction with Miller Motor Co., Chicago.

Power for the clamp is a small and inexpensive hydraulic pump operating at 250 psi. The 15 tons of pressure is obtained by using a 5-in. bore fluid pressure booster (ratio 6.25 to 1) that drives a 5-in. bore high pressure cylinder. The piston rod of the latter operates the movable clamping member. Booster and cylinder are assembled integrally as a single compact unit with no high pressure piping used between them. Brass V-jaws on the clamp prevent marring of the polished rod finish under the tremendous clamping pressure.

* * *

Three Metallurgy Teachers Get $2,000 Teaching Awards

THE three best jobs of teaching in the field of metallurgical engineering during 1951-52 have earned the teachers each $2,000. Donor of the awards is the American Society for Metals. The prizes are a direct aid in the teaching of more qualified engineers for industry, government and private research.

The winners are: Arthur A. Burr, associate professor, department of metallurgy, Rensselaer Polytechnic Institute, Troy, N. Y.; Joseph W. Spretnak, associate professor, department of metallurgical engineering, Ohio State University, Columbus, O., and Robert D. Stout, professor, department of metallurgy, Lehigh University, Bethlehem, Pa.

* * *

H. K. Porter Buys Forging Firm

To further diversify its manufacturing operations, H. K. Porter Co., Inc., has acquired The Watson-Stillman Co., Roselle, N. J., manufacturers of forged steel fittings and hydraulic equipment.

Take the problem out of welding problem steels!

Use P&H Low-Hydrogen Electrodes

The right low-hydrogen electrode for your job!

70LA-2 (E6016, E7016)
General-purpose electrode for high-carbon, low-alloy, high-tensile, and high-sulfur free-machining steels.

70LB (E7016)
For repair welding of Grade B and other castings of similar analysis.

P&H .25C (E7016)
For castings repair where high carbon is preferred to alloys for raising tensile strength.

75LP (E8016)
For 2% to 3% nickel steels, both cast and rolled.

80LP (E8016)
For chrome-moly power piping and fittings.

90LE (E9016)
For higher-analysis chrome-moly power piping and fittings.

P&H .40C (E9015)
For .40 carbon castings and rolled steels where you want to match both chemical and mechanical properties.

AW2B (E9016)
For repair welding of cast armor, "off-analysis" steels, recalled rail steels, and high-sulfur steels.

P&H # 7 (E9016)
For repair welding of Grade C and other castings of similar analysis.

90LH-2 (E10016)
For alloy steels, such as SAE 8630, 4130, and comparable types where the weld metal must match the heat-treating properties of the parent metal.

P&H # 12 (E10016)
For difficult fabricating jobs involving high-tensile and alloy steels with little or no preheat.

P&H # 17 (E12016)
For high-hardenable steels subject to high impacts through a wide temperature range.

P&H # 21 (E15016)
For aircraft and similar steels, such as 4340 and 4130.

. . . . and get high-strength welds that are free of underbead cracking

P&H has the most complete line of low-hydrogen electrodes in the industry — many "custom-made" to match the chemical analysis or heat-treating properties of a variety of alloy steels. This wide selection eliminates the difficulties in welding problem steels, such as high-sulfur free-machining, high-carbon, low-alloy, and high-strength steels.

The core wire of these electrodes is of a mild steel or a low alloy, thereby greatly reducing the cost of the low-hydrogen electrode, as compared to the higher-alloy types.

The coating ingredients of these P&H electrodes are mineral- and also hydrogen-free, with low moisture content. This eliminates underbead cracking and permits the welding of "difficult" steel with little or no preheating.

Other important advantages are: Better impact properties through a wider temperature range; Greater ductility at high tensile strengths; High-quality X-ray; As-welded properties that approach values ordinarily obtained only after stress relieving; More accurate control of alloying elements; No need for annealing before enameling; Higher heats for higher deposition rates.

Get better welds on "difficult" steels — cut your costs. Get P&H Low-Hydrogen Electrodes from your P&H representative or local distributor.

Just off the press — new bulletin on P&H Low-Hydrogen Electrodes! Send coupon for your free copy.

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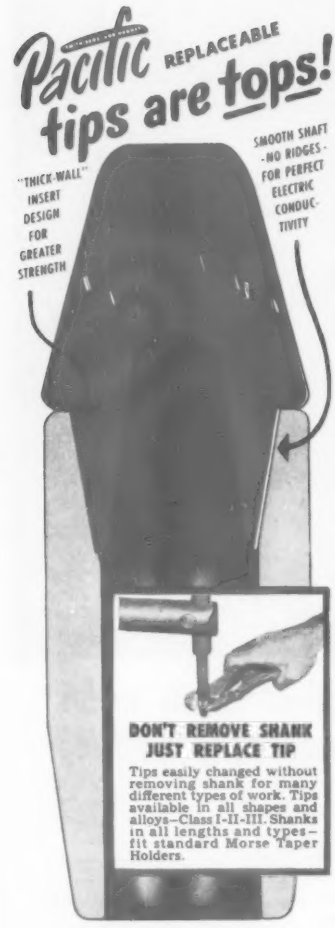
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DON'T REMOVE SHANK JUST REPLACE TIP
Tips easily changed without removing shank for many different types of work. Tips available in all shapes and alloys—Class I-II-III. Shanks in all lengths and types—fit standard Morse Taper Holders.

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PACIFIC TIPS are the famous *replaceable* spot weld tips that are *irreplaceable! Accept no substitutes!* For finest performance at lowest cost be sure you get PACIFIC. Users report savings up to 50%. Scientific design fully protected by patent. Saves machine down time, wear and inventory costs. Use in machines, portable guns . . . in straight or offset holders. Get complete information and prices today.

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Smith Bros. & Hughes

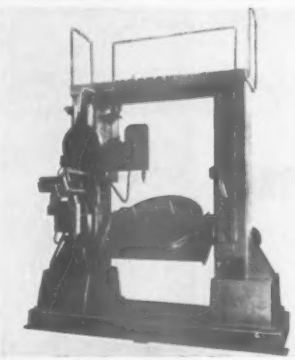
5304 Banks St., San Diego 10, Calif.

Manufacturers—resistance welding electrodes and accessories, automatic screw machine products

Inquire for Distributor and Dealerships

NEW PRODUCTS

(Continued from page 60)



Inert-Arc Machine

262 A NEW welding machine and positioner comes equipped for either inert-gas welding or submerged-arc applications, depending on the customer's needs. The tilting table has variable rotation speeds. For mounting multiple welding equipment there are machined slides on the four columns. The latter also support the overhead platform for mounting auxiliary equipment such as flux-recovery systems.

Vertical operation of the saddle is accomplished either manually or under power-driven controls which are located in a pendant station. The table drive passes through a two speed, lever-operated disc clutch gear case. Both normal welding speeds and rapid traverse for positioning are possible. The table surface includes bored pilot holes.

The machine has 50-in. of vertical saddle adjustment, 11-in. of horizontal crossrail adjustment, 24-in. of head mounting block adjustment, 300 deg of table tilt with a 20 to 1 table rotation ratio. The table will carry a maximum load of ten tons 6 in. eccentric 6 in. above the table.

MORTON MFG. CO., Muskegon Heights, Mich.

* * *

Spooled Welding Wire

263 ALUMINUM wire electrodes for inert-gas metal-arc welding are available in coil form in 2S, 43S and 52S alloys. Weldwire brand electrode wire is said to be triple-cleaned and precision layer-level wound on 10-lb spools. Standards for wire temper are added to complete de-kinking and precise layer-level winding to provide smooth wire feed.

WELDWIRE CO., INC., Philadelphia 25.

A Tip On Acetylene Hard Surfacing

Showing a typical hard surfacing application of Ranite No. 4 on beet harvester part.

Here is a new improved Acetylene hard surfacing rod. Ranite No. 4 is now coated with a thin "Wash Coat" flux. This newly developed metallic flux joins the alloy-core rod, making a tough, hard-wearing overlay (Rockwell Hardness 52-58).

The flux action creates a smooth, clean puddle, easy to apply on thin applications. It deposits an even wearing protective surface for all types of agricultural implements and industrial applications.

This rod gives excellent wearing characteristics up to 800°F. Ranite No. 4 is now available through distributors of the Rankin Manufacturing Company, manufacturers of Ranite welding rods. If you have application for Acetylene hard surfacing, contact your nearest dealer, or write to Rankin Manufacturing Company, 3072 West Pico Blvd., Los Angeles 6, California, for further details.

Now . . . Seams Reduced to **ABSOLUTE MINIMUM** on these NEW AO Gloves!

HAND PROTECTION

AO 514 ASBESTOS GLOVE

Yes, for workers' comfort . . . for savings for our customers, we've redesigned our asbestos glove line to eliminate seams wherever possible. By reducing seams from 8 to 3, there's not only greater working ease for the user but longer work life for the glove.

MAKE THIS COMPARISON TEST!

Look at any conventional asbestos glove. Note the vertical seams that extend to the cuff. Note the seams that secure gauntlet to glove. Now check against the large photograph here. You'll see the seams on the thumb and only ONE SEAM extending the length of the glove (on the back). Note also the absence of horizontal seams—(thus assuring a stronger glove and longer life which means valuable savings).

AO 1514 Glove with leather-reinforced palm.

AO 2514 Glove with asbestos-reinforced palm.

AO 3514 Glove with full leather-reinforced palm and finger area.

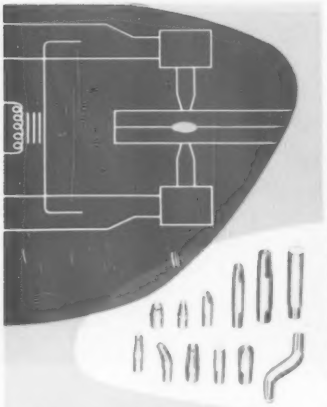
QUICK FACTS:

- Finest grade specially treated asbestos, recommended for extreme heat.
- Yarn is closely woven.
- Double stitched for long service.

AO's Industrial Vision Program increases production, decreases accidents. Write today for free booklet "Improved Industrial Vision" to 1113 Vision Park, Southbridge, Massachusetts.

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



Good tips
for resistance-welding machine users

AMPCO WELD*

spot-welding tips cut costs, downtime; increase production

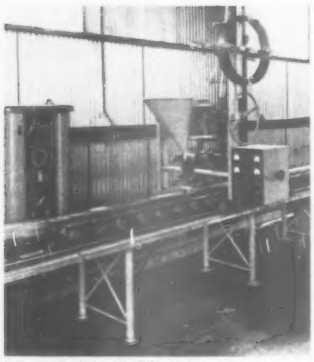
Ampco Weld spot-welding tips can take it. Manufactured under rigid laboratory control at Ampco's own plants, they resist mushrooming and wear and their high electrical conductivity minimizes sticking to the work.

This outstanding combination of properties results in a resistance-welding electrode that requires fewer dressings and pays off in longer runs, reduced downtime, lower costs.

Ampco Weld tips are only part of a complete line of resistance-welding products, not only meeting but exceeding RWMA specifications. Ampco Metal, Inc. gladly furnishes engineering service for special applications. Step up your production — order Ampco Weld resistance-welding tips now.

*Reg. U. S. Pat. Off., Ampco Metal, Inc.

AMPCO **Ampco Metal, Inc.**
Milwaukee 46, Wisconsin
West Coast Plant: Burbank, California
It's production-wise to Ampco-ize!
aw-s



Track-Rail Welder

264 A NEW packaged welder-positioner may be used to rebuild crawler tracks, to fabricate beams, pipe or logging reaches and to hard-face scraper blades, dozer lips and similar abrasion damaged members. Called the Dean track-rail welder, it includes a 10-ft long welding bed that is sturdily braced and has clamping screws and adjustable footings. Extra 10-ft sections are available for long jobs.

The carriage is all-welded and carries the welding control, welding head, flux bin and feed chute, electrode reels and carriage drive motor. The main control has a panel that indicates current and voltage, travel speed, rod feed adjustment and other pertinent information. Cabinet can be removed from the carriage for fast servicing.

The entire machine is a package and includes everything needed to start welding including a 500-amp welder.

DEAN WELD MACHINE, INC., Oakland, California.

* * *

Welding Turntable

265 A NEW variable speed turntable operates in both directions and at a 90-deg angle to the horizontal. Each custom-adjusted turntable is equipped with four speeds, the lowest of which may be ¼ revolution per minute or as high as 14½ revolutions per minute.

The standard turntable is 15-in. in diameter and has an overall height of 5½ in. Its capacity is 300 lb. A telescopic base for regulating the height is optional as is a foot switch. It may be fully insulated for welding applications.

UNIQUE TURNTABLE & DISPLAY CO., New York City 35.

* * *

To obtain additional information on listed new products, use the cards on pages 17-18.

Tempilstik°

the amazing Crayons that tell temperatures

A simple method of controlling working temperatures in:

- WELDING
- FLAME-CUTTING
- TEMPERING
- FORGING
- CASTING
- MOLDING
- DRAWING
- STRAIGHTENING
- HEAT-TREATING IN GENERAL

It's this simple. Select the Tempilstik° for the working temperature you want. Mark your workpiece with it. When the Tempilstik° mark melts, the specified temperature has been reached.

$2 each

gives up to 2000 readings

Available in these temperatures (°F)

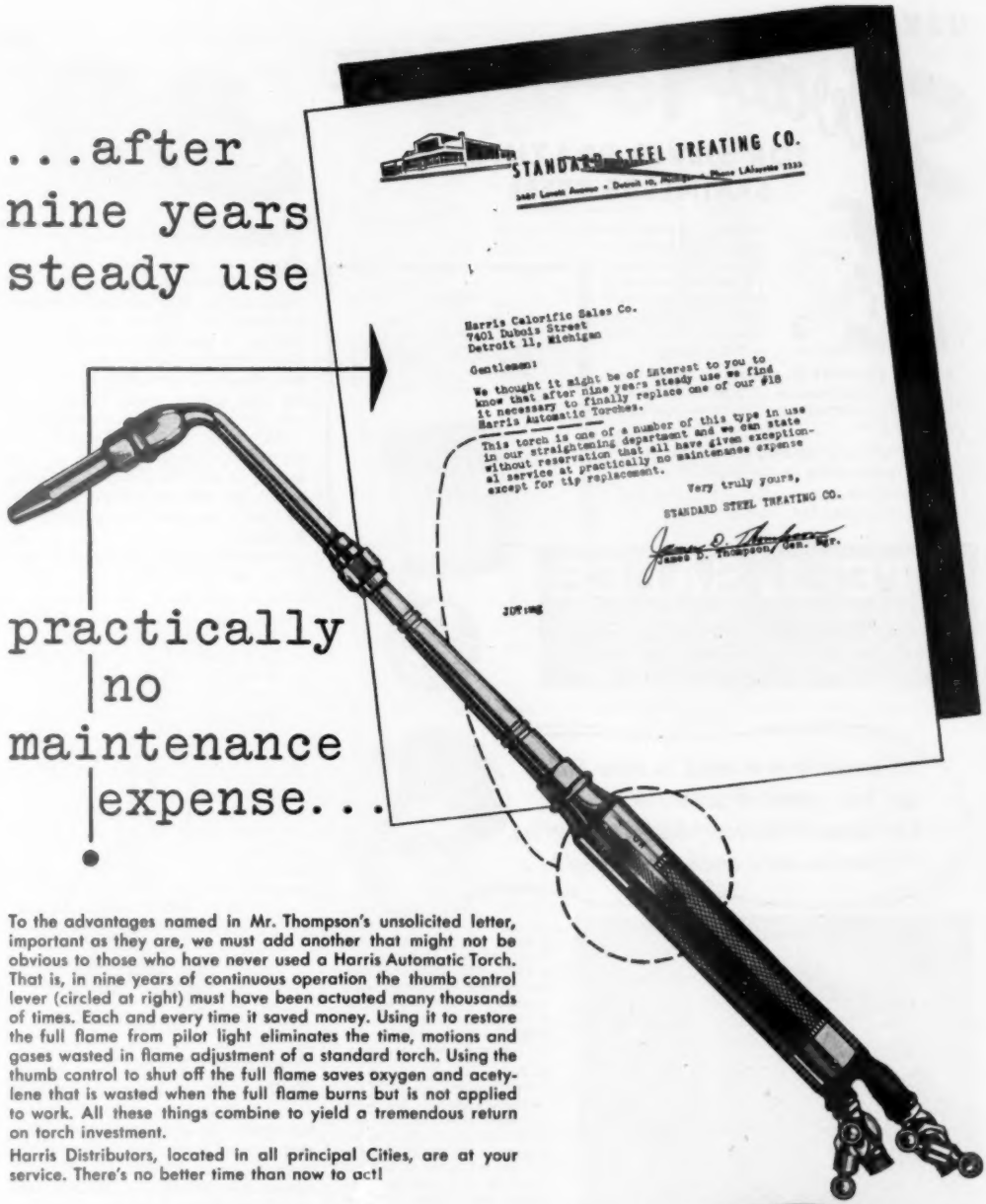
113	263	400	950	1500
125	275	450	1000	1550
138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
250	388	900	1450	2000

Also available in pellet or liquid form.

FREE —*Tempil° "Basic Guide to Ferrous Metallurgy"* — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

Tempil° corp.
11 WEST 25th STREET
New York 10, N. Y.

...after
nine years
steady use


STANDARD STEEL TREATING CO.
Harris Calorific Sales Co.
7401 Dubois Street
Detroit 11, Michigan
Gentlemen:
We thought it might be of interest to you to know that after nine years steady use we find it necessary to finally replace one of our #18 Harris Automatic Torches.
This torch is one of a number of this type in use in our straightening department and we can state without reservation that all have given exceptional service at practically no maintenance expense except for tip replacement.
Very truly yours,
STANDARD STEEL TREATING CO.
James D. Thompson, Gen. Mgr.

practically
no
maintenance
expense...

To the advantages named in Mr. Thompson's unsolicited letter, important as they are, we must add another that might not be obvious to those who have never used a Harris Automatic Torch. That is, in nine years of continuous operation the thumb control lever (circled at right) must have been actuated many thousands of times. Each and every time it saved money. Using it to restore the full flame from pilot light eliminates the time, motions and gases wasted in flame adjustment of a standard torch. Using the thumb control to shut off the full flame saves oxygen and acetylene that is wasted when the full flame burns but is not applied to work. All these things combine to yield a tremendous return on torch investment.

Harris Distributors, located in all principal Cities, are at your service. There's no better time than now to act!

THE HARRIS CALORIFIC COMPANY

Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905

USE

Silvaloy ALLOYS and FLUX

FOR SILVER BRAZING STAINLESS STEEL

Silvaloy 335 is a low temperature cadmium-free alloy especially adapted for brazing of food handling and dairy equipment, and where a close color match is desired.

Silvaloy 50 and 45 are extremely fluid. Free-flowing at temperatures of 1145° F. to 1295° F. Especially designed for production brazing on stainless steel.

GAS AND ARC WELDING ELECTRODES FOR THE WELDING OF STAINLESS STEEL

Coated rods in either A.C. or D.C. Titania coated or Lime D.C. coated.

USES

Use 1200 Flux for silver brazing Brass, Stainless Steel, Bronze, Nickel-Silver, Steel, Monel, Inconel, Nickel and Cast Iron. Furnished in ½ lb., 1 lb., 5 lb., and 30 lb. containers.

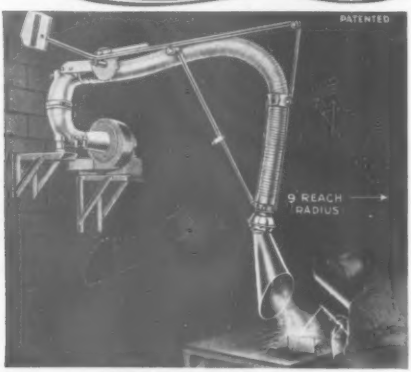
STEEL SALES

3348 S. PULASKI ROAD • CHICAGO 23, ILLINOIS

PLANTS: DETROIT, ST. LOUIS, MILWAUKEE, MINNEAPOLIS

OFFICES: INDIANAPOLIS, GRAND RAPIDS, KANSAS CITY

"It certainly is a relief to have fumes and heat removed while I'm welding. The Ruemelin Collector has great suction. It makes a day's work pleasanter!"



Ruemelin Fume Collector in operation.

Welding shops equipped with Ruemelin Fume Collectors are assured of a clean shop atmosphere. Noxious fumes, heat and smoke are eliminated at their source, thus improving working conditions, lessening fatigue and paving the way for increased plant production.

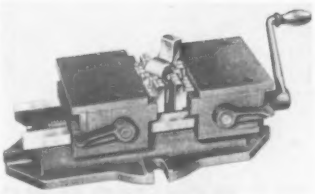
The Ruemelin Fume Collector hood can be instantly placed where needed anywhere in the booth welding area. No tedious adjustments necessary. Just pull the inlet hood to the welding position and you are ready to go. Approved by state industrial commissions and by compensation insurance companies. Simple to install. Thousands in service. Many users send in repeat orders. Write for bulletin 37-D today.

RUEMELIN MFG. CO.

MANUFACTURERS AND ENGINEERS

SAND BLAST AND DUST COLLECTING EQUIPMENT

3880 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.



Positive Grip Vise

266 SPECIAL multiple jaws in the "American Positive Grip Vise" eliminate the need for special fixtures on many jobs. After working on the first of a series of identical workpieces, the jaws are slightly released and the mold or matrix formed by the first unit is ready for the next one. No realignment is necessary.

An even pressure distribution throughout the entire series of jaws is said to provide powerful gripping action on odd-shaped pieces, balls, etc. Each jaw slides completely independently.

CONNORS AND DAVIS SALES CORP., West Springfield, Mass.

* * *

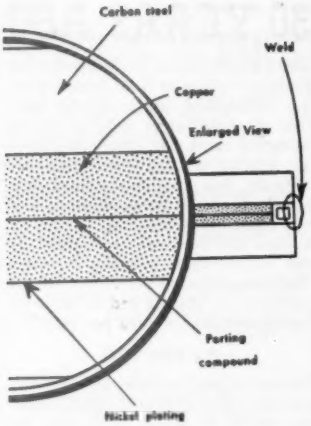
All-Purpose Torch

267 FROM the fast-growing liquid propane gas equipment industry comes an all-purpose torch that may be used to preheat welding work, thaw pipes or ground, etc. Its heat output may be adjusted from 50,000 to 750,000 Btu's. Fuel may be either propane or butane gas in standard bottles. Outfit includes a rubber-tired truck for moving torch and fuel bottle to the spot wanted.

INTERNATIONAL MFG. CO., Denver, Colo.

* * *

To obtain additional information on listed new products, use the cards on pages 17-18.



Copper-Clad Steel

268 COPPER clad steels now being produced by Lukens Steel Co. are expected to find their place in electrical, heat-transfer and corrosion applications.

Available in plate gages only, Lukens copper-clad steel consists of a layer of copper permanently and uniformly bonded to one side of a carbon steel backing plate. Cladding percentages of 10, 15 or 20% of total plate thickness will be regularly furnished in plate sizes up to 120 in. wide, 380 in. long and 3/16 to 1¼ in. thick. Copper-clad steels are also available in flanged only or flanged and dished heads. Two types of copper are furnished, oxygen-free high conductivity copper for special electrical applications and phosphorous deoxidized copper for improved weldability.

LUKENS STEEL CO., Coatesville, Pa.

* * *

New Product Briefs

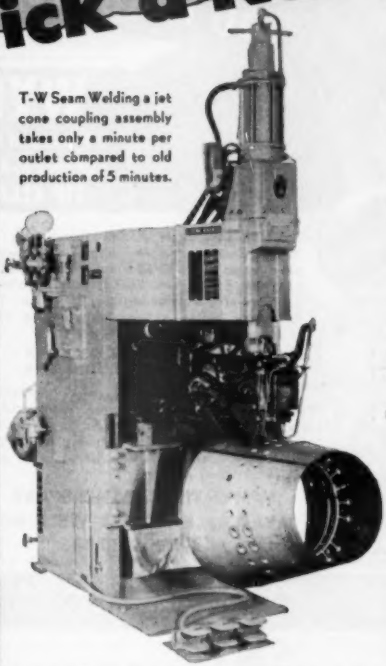
269 **Universal amplifier** for use with direct writing oscillographs in studies of static or dynamic strains up to 100 cys can be used in 19-in. racks having 7-in. front panels. Called Model B1-360, it was designed for used with the SR-4 120 ohm strain gage. The Brush Development Co., Cleveland 14.

* * *

270 **Magnetic base** on a portable electric light fixture makes it possible to have good illumination on any part of machine shop equipment or along an assembly line. The "Miti-Mite" fixture holds either a 25 or 40 watt bulb. Enco Mfg. Co., Chicago 39.

Cessna Bendix Pratt Packa
Budd **Pick a Name** Gibson
Sikorsky General Ele
A. V. Roe Lewyt
McDonnell Twin Coach
American Northrop
MacDonald Oldsmobile
Douglas Beech
North Amer Western Ele
Canadair Allison
Ryan Aero Westingho
Goodyear Hughes
Glen Martin Consolidat
Boeing Harrison
Solar Aircr United Airc
ChanceVou Heintz

T-W Seam Welding a jet cone coupling assembly takes only a minute per outlet compared to old production of 5 minutes.



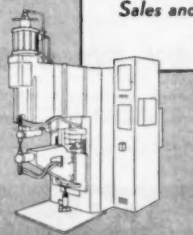
Any one of them uses T-W Resistance Welders to meet Military Specs

● Users of T-W resistance welders have been meeting military specs for some 12 years. When you meet up with the current specifications Mil-W-6860 and 6858 (formerly AN-W-30 and 32), take advantage of this experience. Whether your job is ordnance, aircraft parts, radar, or what have you—you can meet military specifications with T-W welders.

Call on Taylor-Winfield for counsel and assistance on your production. All sizes and styles of resistance welders.

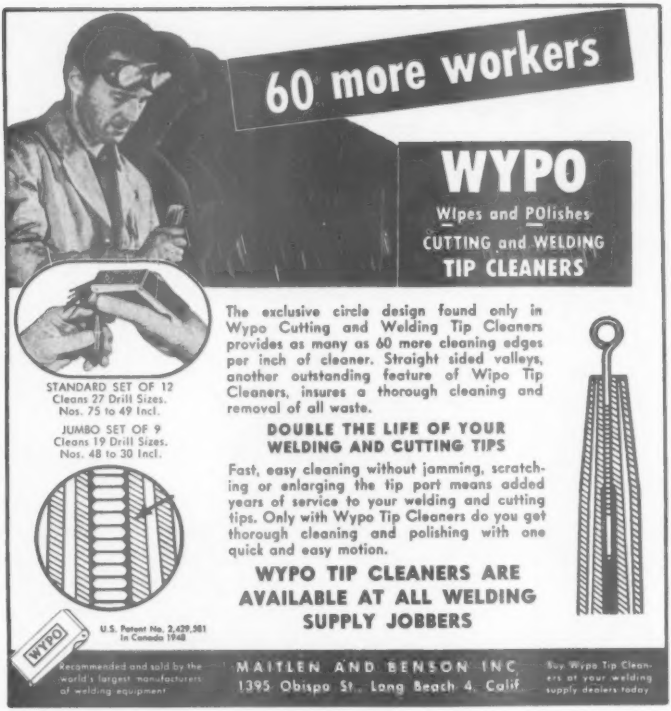
TAYLOR-WINFIELD CORPORATION - WARREN, OHIO

Sales and Service in All Principal Cities



RESISTANCE WELDERS SINCE 1898

TW TAYLOR-WINFIELD
RESISTANCE WELDERS


60 more workers
WYPO
Wipes and POlishes
CUTTING and WELDING
TIP CLEANERS
STANDARD SET OF 12
Cleans 27 Drill Sizes.
Nos. 75 to 49 Incl.
JUMBO SET OF 9
Cleans 19 Drill Sizes.
Nos. 48 to 30 Incl.
The exclusive circle design found only in Wypo Cutting and Welding Tip Cleaners provides as many as 60 more cleaning edges per inch of cleaner. Straight sided valleys, another outstanding feature of Wipo Tip Cleaners, insures a thorough cleaning and removal of all waste.
DOUBLE THE LIFE OF YOUR WELDING AND CUTTING TIPS
Fast, easy cleaning without jamming, scratching or enlarging the tip port means added years of service to your welding and cutting tips. Only with Wypo Tip Cleaners do you get thorough cleaning and polishing with one quick and easy motion.
WYPO TIP CLEANERS ARE AVAILABLE AT ALL WELDING SUPPLY JOBBERS
U.S. Patent No. 2,429,581
In Canada 1948
WYPO
Recommended and sold by the world's largest manufacturers of welding equipment
MAITLEN AND BENSON INC.
1395 Obispo St., Long Beach 4, Calif.
Buy Wypo Tip Cleaners at your welding supply dealers today

ACCURATE PRECISION WELDING
MADE EASY...
1. PERMANENT ACCURACY OF FLAME. Assured by spring tension control valves.
2. Armored attachment gasket between mixer and torch handle. Minimizes wear.
3. PRECISE GAS MIXTURE. No need to change mixture to fit tip size.
4. LIGHT WEIGHT alloy handle. Weight reduced. Less fatigue, longer production periods.
AVIATOR-JET TORCH
RUGGED • LIGHT • EASY TO USE
Here's the perfect double duty torch wherever sheet metal is welded. Uses either oxygen, acetylene, or oxygen and hydrogen. Designed for automobile body shops, refrigeration servicemen, electric manufacturers, and other sheet metal welders.
Ask your dealer to show you the AVIATOR-JET Cutting Attachment too! Cuts up to one inch.
Modern Engineering CO., Inc.
3411 PINE BLVD.
ST. LOUIS 3, MO.

30 YEARS AGO

SOME 1,600 cars of the Third Avenue Railway System of New York are being maintained largely by the services of a competent welding service in its car barns. The company started arc welding in 1915 with carbon arc methods, but now has switched over largely to metal arc welding. Almost all bronze armature parts, brushholders and bearings are welded by the oxyacetylene process, however. The shop uses about 25,000 lb of mild steel electrodes and 1,500 lb of manganese bronze rods per year.

—30 YEARS AGO—

LIQUID oxygen's uses as an explosive are discussed in this month's magazine by E. H. Smith, of Smith's Inventions, Inc. He tells how he did a creditable job of stump blasting with a home-made blasting bomb. It consisted of a linen sack filled with powdered charcoal and soaked in liquid oxygen for two minutes. Set off with a long fuse, the bomb shattered the stump's roots completely.

—30 YEARS AGO—

EMPTY carbide cans make up the complete outside structure of a large summer camp building in northern Wisconsin. The building was designed and constructed by S. D. Winger, manager of the Gas Products Co., Columbus, O. An oxyacetylene cutting torch was used to cut and shape the cans to proper size.

—30 YEARS AGO—

C. H. DOCKSON, formerly of the Weldit Acetylene Co., Detroit, has recently organized the C. H. Dockson Co. at 161 East Columbus St., Detroit. In 1917 he organized the Oxweld Acetylene Equipment Co. which was later changed to the Weldit Acetylene Co. His new firm will manufacture oxyacetylene torches and equipment for nationwide sale.

—30 YEARS AGO—

N. H. WAGNER, a superintendent for the Prairie Pipe Line Co., recently told a convention of the International Acetylene Association that his company had completed 140 miles of 8-in. welded line that developed no failures.

—30 YEARS AGO—

SIXTEEN balloons 15-ft. in diameter were filled with hydrogen at the Indiana State Fair recently by the Indiana Oxygen Co. J. R. Brandt was in charge of operations at the fair. Purpose of the balloons was to ballyhoo the fair and also to see how far they would travel before coming to earth.

WELDERS' CLAMPS

HARGRAVE Tested Tools
THE CINCINNATI TOOL COMPANY

Each Tool Is Individually Power - Tested

Ask for CATALOG showing the most complete line of CLAMPS. Stock sizes from ¾" to 12" opening ½" to 16" deep.

THE CINCINNATI TOOL CO.
1944 Waverly Ave., Cincinnati 12, Ohio

THERE IS AN INDUSTRIAL DISTRIBUTOR STOCK NEAR YOU

TILLMAN
GLOVES • GARMENTS

BRAZILIAN DEERSKIN
Gloves and Mittens
The stay soft leather
New Catalogue
Now Available

TILLMAN PRODUCTS
JOHN TILLMAN & CO.
LONG BEACH, CALIF.

About People

CANUTE R. OLSEN has been appointed manager of the market development division of the United States Steel Supply, Chicago, and LINUS E. OLSON was named manager of the inventory control division in the sales department.

* * *

F. L. BLODGETT was promoted to assistant general sales manager of the Alloy Rods Co. He was formerly manager of the hard-facing division. Mr. Blodgett has been associated with various phases of the welding industry for the past 15 years. In his new post, he will be closely associated with national distributor activities, and the merchandising and advertising programs of Alloy Rods. His headquarters will be at the factory in York, Pa.

* * *

PAUL J. FOLEY was appointed manager of Worthington Corp's Kansas City office, and WILLIAM M. FINE was named to head up the Milwaukee branch office.

* * *

GEORGE W. PARTLOW has been appointed supervisor of general accounting for United States Steel Supply Division and GORDON F. JOHNS succeeds Linus E. Olson as priorities administrator. Mr. Partlow, a native of Chicago, succeeds John F. Baasel, who has retired.

* * *

J. D. GREENSWARD was named vice president, director of manufacturing of the general machinery division for Allis-Chalmers Mfg. Co. He was recently director of manufacturing for the division at which time he succeeded Fred Mackey who had resigned. Mr. Greensward was previously the general manager of the Allis-Chalmers Norwood, Ohio, works. P. F. BAUER has been named general manager of the Norwood Works and manager of the firm's apparatus department succeeding Greensward.

* * *

JOSEPH C. SCHAD has rejoined the American Welding Supply Co., New York. He was recently released from the armed forces.

EVER BEEN PENNY WISE—TIME FOOLISH?

Shopping for supplies is often like that.

Now is the time to investigate the important services your nearby All-State Distributor offers.

1. ONE SOURCE OF SUPPLY
It makes sense to make your A-S Distributor and All-State your one proven source for all alloys and fluxes needed for welding, brazing, soldering, tinning and cutting.

2. BETTER JOBS FOR LESS
A-S Distributors stock a large variety of things you have to have quickly when you want them. They're competitive on price—usually lower if your eye is on the job costs. That comes of their handling All-State Alloys and Fluxes for all metals. They do better jobs for less.

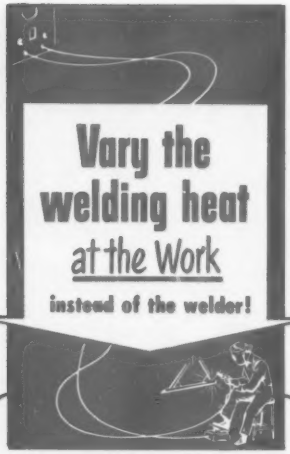
3. TECHNICAL SERVICE
Each All-State Distributor has men especially qualified by training and experience to aid in the proper selection and use of alloys and fluxes for jobs where you might need help. Back of them, and always ready to pitch in on the problem jobs are the All-State regional men and the well-known All-State technical service facilities at White Plains, N. Y.

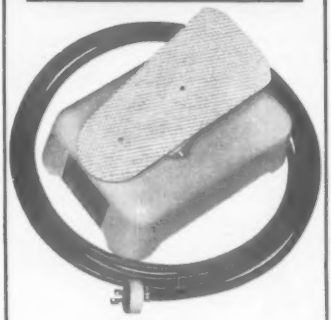
4. FREE LITERATURE
Ask for 32-page Buyers Guide to the complete line of All-State Alloys and Fluxes for welding, brazing, soldering, tinning and cutting.

A-S DISTRIBUTORS EVERYWHERE

All-State

ALL-STATE
WELDING ALLOYS CO., INC.
White Plains, N. Y.





Mullenbach

ARCTROL

Provides *portable* voltage control at the work; selects the exact welding heat for every job *without walking back to the welder!* Retains full welder heat range; saves hours; makes better, more uniform welds. *Handiest aid any welder ever had*—for precision welding, for production jobs!

Available for most makes of D.C. arc welding machines. Write for descriptive ARCTROL circular, giving make and model number of your welder!

Mullenbach
Electrical Manufacturing Co.
2300 East 27th Street, Los Angeles 58, California

S. FREDERICK MAGIS has been named steel technologist at Armour Research Foundation of Illinois Institute of Technology. Mr. Magis has been assigned to one of three Point IV industrial projects the International Division is conducting in Pakistan. With headquarters in Karachi, he will survey Pakistan's steel plant operations, lend technical assistance to speed up production, consider use of natural resources in the industry, and train plant personnel. He is a consulting engineer with 26 years experience in the steel industry.

* * *

HAROLD A. BURNIP has been appointed director of purchase engineering for The Lincoln Electric Co. of Cleveland. He has been with Lincoln for ten years. In recent years as project engineer he supervised the building of Lincoln's new $10,000,000 plant. Prior to this he served as purchasing agent for Lincoln.

* * *

WILLIAM J. THOMAS, general sales manager of the tubular products division of The Babcock and Wilcox Co,. has been named to the board of directors of the division.

* * *

R. B. CHESSIN has recently joined the Pyramid Steel Co. of Cleveland, O., as a sales executive. Mr. Chessin was formerly assistant sales manager of Allied Steel Products, also of Cleveland.

* * *

SHELLER L. STEINWENDER has been appointed sales vice-president of Scaife Co. He was with A. O. Smith Corp. since 1944 and was general sales manager of the eastern district located in New York City.

* * *

ALFRED K. ALTHOUSE and RICHARD JAMES, III, have joined the Alloy Rods Co., York, Pa., as field representatives. Mr. Althouse will make headquarters in Philadelphia while covering the Pennsylvania, New York and New England States. Mr. James will be located in Cleveland, taking care of Michigan, Ohio, Indiana, Kentucky and Tennessee.

* * *

A. S. BLODGET, JR., replaces S. D. EDSALL as manager of the Air Reduction Sales Co., Pittsburgh district, after Mr. Edsall's recent death. E. S. TWINING, JR., succeeds Mr. Blodget as Boston district manager.

"Red Head"
WELDING CLAMPS

- Designed for Welding
- No Threads To Damage

1. Case Hardened threads are always protected from weld spatter and never exposed to damage in open or closed position.

2. The clamp body is cut from solid plate, thereby insuring extreme rigidity and giving great resistance to bending or twisting.

3. Heat treated chrome molybdenum alloy handle offers great resistance to bending.

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HARD SURFACING
ELECTRODES

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Large Rods

SMOOTHER . .
No Slag

25% MORE COVERAGE

All Metallic Coating

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Bergstrom H. F. M. 600
(Pat. Pending)
For making a Surface of 600 Brinnel Hardness on Manganese.

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VICTOR WELGE was appointed associate director of engineering for P. R. Mallory & Co., Inc., Indianapolis. He was formerly with Consolidated Vultee Aircraft Corp., San Diego, where he headed the electronics and missile section.

* * *

GEORGE H. POWERS was appointed refractories engineer for Norton Company, covering the New York and New Jersey territory. He replaces FRED E. LEIBY, who retired after 29 years with the company. ENFRIED T. LARSON, former sales engineer, was appointed editor of all technical publications.

* * *

IRVING R. TAYLOR has been appointed assistant manager of the Warren machine and die division of The American Welding and Mfg. Co., Warren, O. A native of Warren, Taylor has been associated with another Warren concern, the Taylor-Winfield Corp., for the past 19 years.

* * *

EARL L. PRAIS has been appointed quality control manager of The Liquid Carbonic Corp., Chicago, Ill.

* * *

HOWARD B. STEGGALL, a vice-president of United States Radiator Corp. since 1945, has been appointed senior vice-president.

* * *

MATT. W. STANLEY has been appointed assistant treasurer of Aluminum Co. of America. He will act as general assistant to the vice-president and treasurer.

* * *

CHARLES A. CARLSON JR. has been appointed an assistant district sales manager of Lukens Steel Co., Coatesville, Pa. He will be in charge of the New York sales area and make his headquarters in Albany, N. Y.

* * *

RANSOM COOPER, JR. has been appointed manager of the nickel sales department of The International Nickel Co., Inc., and H. D. Tietz is new manager of the Inco nickel alloys department. Both men will work in coordination with Walter C. Kerrigan, general sales manager and L. R. Larson, assistant general sales manager.

* * *

S. JAMES AIRES, JR. was appointed commercial research manager in the market development department of Lukens Steel Co. He was formerly a senior market analyst for Lukens. Aires succeeds Richard W. Dalzell who is now assistant manager of the market development department.

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Keeps these essential welding needs right at your finger-tips. Welding quality increases because when cleaners are handy they are used more frequently and clean tips mean better work.

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STANDARD MODEL	JUMBO MODEL
Fits into hip pocket. For use on pipe 1½ to 18 inches.	For 16 to 48 inch pipe. Includes belt to fasten on pipe.

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Announcing the New, Improved "Lift Front" Plate Retainer

Here is the new Sellstrom "Lift Front" plate retainer, mounted on the No. 243-S Helmet but also supplied with any of the other helmets. Consider these facts:

1. The inner clear plate is mounted in a separate stationary frame behind the filter plate, where it is retained in a permanent position because it does not move with the filter plate. Thus the eyes are fully protected from fly ng slag even when the filter plate is in a "lifted" position. The filter plate and the clear protective plate are held in place by separate tension springs.
2. A hidden spring in the hinge keeps the window firmly in the up or down position.
3. The "Durez" plastic frame combines light weight with strength. A pressed steel cover front offers extra protection if accidentally dropped.

The No. 243-S Welding Helmet

Welding helmets differ in design, character and service rendered. This helmet is unusually popular because of the following:

1. One-piece construction, perfectly balanced, rounded top and bottom for full protection.
2. Plastic knobs at back and sides permit quick adjustment for size. Easily adjusted tension springs keep the helmet in any position.
3. Specially designed vulcoid headgear has a forehead cushion of genuine top grain hatter's leather, which greatly adds to wearing comfort.
4. Meets all Federal Specifications.

This helmet equipped with the new "Lift Front" Plate Retainer is so new that your dealer may not have it in stock. We therefore suggest that you ask us to forward a sample of the No. 243-S Welding Helmet with the "Lift Front" Plate Retainer for inspection purposes. We will also be glad to give you the name of a nearby dealer who can supply you.

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BOOK REVIEWS

Maintenance

TECHNIQUES OF PLANT MAINTENANCE —1952. Published by Clapp and Poliak, Inc., New York, 1952 Cloth, 8½ by 11 in., 182 pages. Price $6.

Here is given a compilation of the comprehensive discussion of plant maintenance problems presented at the technical sessions of the Third Plant Maintenance show, Philadelphia, Jan., 1952. This report of the conference, which was jointly sponsored by the American Society of Mechanical Engineers and the American Society for the Advancement of Management, is high-lighted by the answers to 717 questions dealing with maintenance problems experienced by engineers from every major industry. In addition there are included the 36 papers presented at the panel meetings.

These papers are divided into groups of general and specific interest. General topics include, cost, inspection methods of records, planning and scheduling, maintenance work and lubrication. Specific problems cover such subjects as the maintenance of electrical equipment, plant buildings, training maintenance workers and supervisors, project preparation and cost control. Possibilities in the problem of plant maintenance are given extensive treatment by size of plant, ranging from those employing less than 50 maintenance workers and carrying through monsters employing over 800 maintenance men.

Like its companion volumes of previous years, *Techniques of Plant Maintenance*—1952, gives a comprehensive picture of the year's findings.

* * *

Welding Stainless

WELDING WITH STAINLESS STEEL ELECTRODES. Published by the Lincoln Electric Co., Cleveland, 1952. Price 25c.

This new 32-page booklet covers the welding of chromium-nickel steels, with and without molybdenum as well as the welding of straight chromium steels, with all established procedures. Most of the material is a reprint from the larger Lincoln welding handbook but is published in booklet form at the present time because of the stainless supply situation.

The analysis of most of the types of each steel and AWS-ASTM classifications are also included.

* * *

Blessed is he who has found his work; let him ask no other blessedness.—Thomas Carlyle

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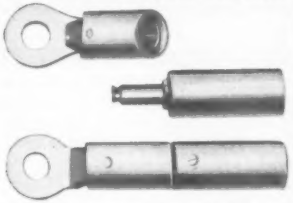

Bolt directly to positive and negative welder studs. Provide easy cable switch to reverse polarity. Simple cable disconnect for quick "Jump-In" of additional cable.

3 Sizes for cables #6 through 4/0

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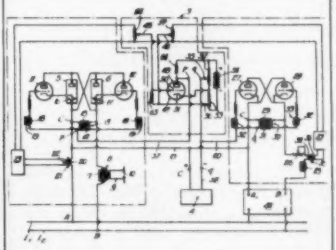
From the Patent Office

R-W Welding System

2,602,155. MARCEL MICHELET, Paris, France. Assigned to Welding Research, Inc., Chicago. Filed Dec. 3, 1949. Granted July 1, 1952.



This patent refers to a control circuit for a welding system that includes a welding transformer with a primary winding. Electric discharge valves are provided for passing current through the winding. Firing valves control the conductivity of the discharge valves. The combination of grid biasing means with the firing valves includes welding current control means for supplying an adjustable direct current voltage. Control transformers superimpose an a-c voltage on the d-c voltage. Other means additionally superimpose a second d-c voltage which is a function of voltage variations in the primary circuit and of impedance variations in the welding system.

• • •

Welding Pins to Metal Parts

2,606,268. ALBERT F. PITYO, Clifton, and HARRY BUTTERFIELD, Maplewood, N. J. Filed March 24, 1950. Granted Aug. 5, 1952.

This method of welding radial pins to the side of a metal tube comprises supporting the tube and turning it intermittently upon its longitudinal axis for a part of a revolution. Thereby, rest periods are provided for the tube. A wire is supported exteriorly of and upon one side of the tube. The wire is held substantially radially with respect to the tube. Moving the wire longitudinally toward the tube when the tube is at each successive rest period so that the free end of the wire contacts with the tube. A welding current is applied to the wire to weld it to the tube.

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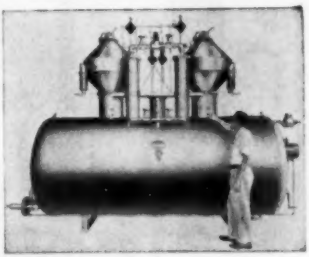

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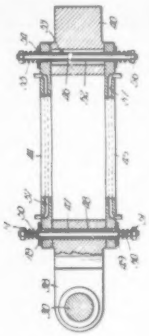
Sliding Contact for Conducting Welding Current

2,600,582. DAVID SCIAKY, Chicago. Assigned to Welding Research, Inc., Chicago. Filed July 26, 1949. Granted June 17, 1952.



This patent refers to an electrical system for conducting high amperage currents. In combination are a stationary member and a vertically movable electrode in horizontal spaced relation with respect to the member. There are means electrically connecting the members comprising a pair of conductive bars disposed on the respective sides of the members and having surface contact with them. Each member provides end parts having flat side areas to facilitate the surface contact of the bars. Special means pivotally join the bars to each member at the area of surface contact including a pivot pin of metal supported by each member and insulated therefrom by being encased in a tube of insulating material. Each pivot pin extends outwardly beyond the respective bars. Resilient means are retained by each end of a pivot pin for yieldingly holding its respective bar in surface contact with the member.

* * *

Aluminum Brazing Product and Method

2,602,413. MIKE A. MILLER, New Kensington, Pa. Assigned to Aluminum Company of America. Pittsburgh. Filed Aug. 13, 1948. Granted July 8, 1952.

A newly patented wrought aluminous brazing product comprises a plurality of aluminous structural members separated and coextensively joined by a layer of aluminous brazing alloy containing from about 2 to 15% silicon. The brazing alloy exhibits a liquidus temperature at least 5 deg C below the solidus temperature of the aluminous structural members. The aluminous brazing alloy layer is at least 0.002-in. thick.

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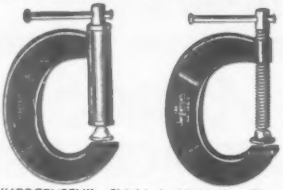
CLAMPS for WELDERS:



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"JORGENSEN" Steel Bar Clamps are designed for the severe requirements of welding service; exclusive "multiple disc clutch" makes for instant adjustment—economy. The trade-mark "JORGENSEN" or "PONY" on your clamps is assurance of utmost satisfaction in service—specify and insist upon them from your supplier. FREE CATALOG ON REQUEST.

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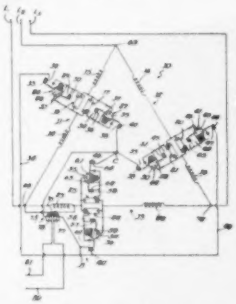
ANTI-BORAX COMPOUND CO., Inc.
FORT WAYNE, INDIANA

3-Phase Welding with Postheat

2,600,585. JULIUS L. SOLOMON, Chicago. Assigned to Welding Research, Inc., Chicago. Filed Feb. 9, 1950. Granted June 17, 1952.



In a newly patented welding system an a-c supply source is connected to the input of a welding transformer and a welding load circuit is connected to the output. There are means for producing in the load circuit an impulse of welding current. The current is characterized as of modulated shape consisting of a pulse of welding current followed by a controlled decay of the current for postheating. The means include phase-shift circuits for respectively controlling the magnitude of the welding current and the magnitude of the postheating current. There are other means automatically operative at a predetermined point in the welding operation for rendering one of the phase-shift circuits operative and the other inoperative.

* * *

Tube Welding Method

2,612,580. RAYMOND C. ANDERSEN, Lombard, Ill. Assigned to Chicago Metal Hose Corp., Maywood, Ill. Filed April 29, 1949.

This patented method of welding a metal tube comprises arranging an elongated cylindrical electrode in the tube. A filament electrode is taken from a supply reservoir. The outer surface of the tube is engaged against the filament electrode at a welding station. The tube and the cylindrical electrode move in a straight line as a unit through the welding station with the filament electrode against the tube. Current is passed between the electrodes as the tube reaches the welding station. The filament electrode is removed from contact with the tube after it passes the welding station.

* * *

Habit is the enormous fly-wheel of society, its most precious conservative agent.
—William James

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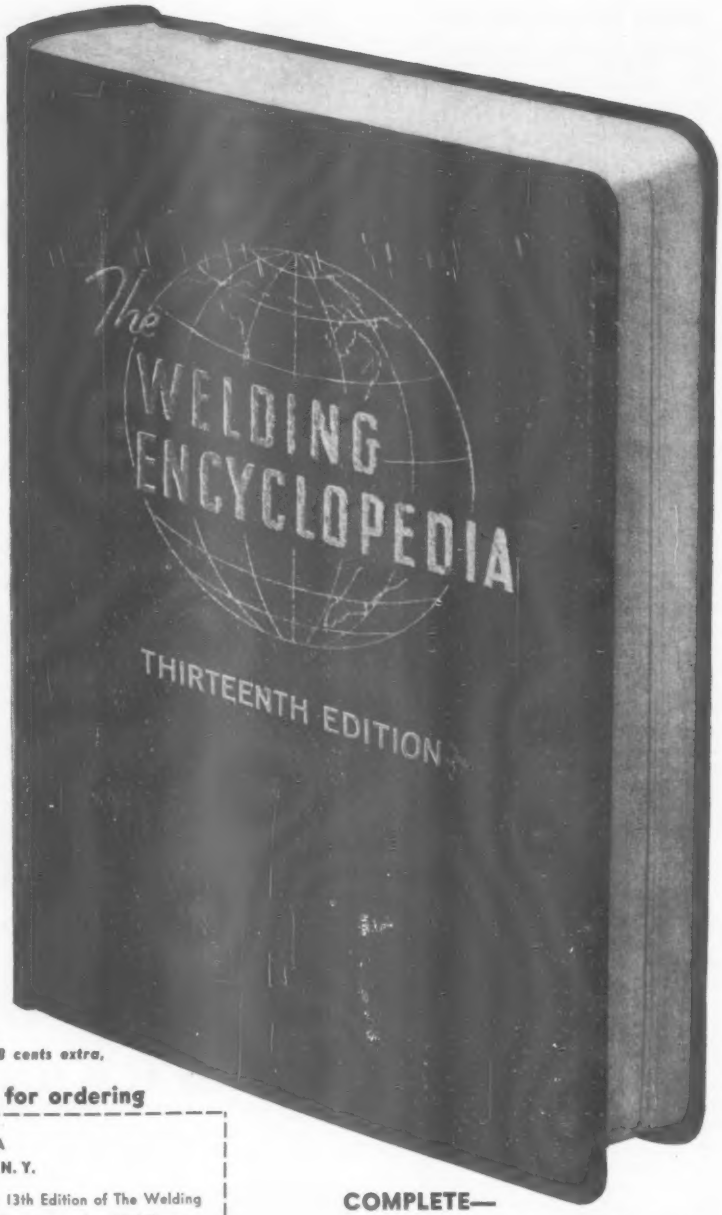

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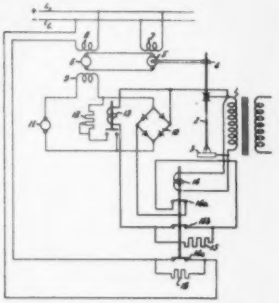
Automatic A-C Arc Welding

2,603,760. HERMANN KOCHER, Wettingen, Switzerland, Assigned to Brown, Boveri & Cie, Baden, Switzerland. Filed July 2, 1951. Granted July 15, 1952.



This newly patented apparatus includes an electrode and work piece with a source of a-c current connected across them. A separately excited d-c motor feeds the electrode toward and away from the work piece. A Ward-Leonard generator energizes the motor. The generator includes a separately excited field winding and a differential field winding. The generator also has a rectifier having sets of input and output terminals and a source of counterpotential of constant magnitude. Circuit elements connect the differential field winding and the source of counterpotential in series with the rectifier output terminals. The rectifier output potential is opposed to and greater than the potential of the source of counterpotential over the range of arc voltage variation. A voltage responsive relay comprises a winding and a set of back contacts. The winding is connected across the source of a-c. There are means operative upon a drop of the potential of the a-c source below the desired range of arc potential to close a by-pass circuit connected between the output terminals of the rectifier. This effects a reversal of the electrode feed motor upon a contact of the electrode with the work piece.

* * *

Aluminum-Copper Rod

2,612,581. HAROLD ROBINSON, Somerville, N. J. Assigned to Air Reduction Co., Inc., New York City. Filed Feb. 11, 1950. Granted Sept. 30, 1952.

This newly patented welding rod includes at least one strand of aluminum wire and one of copper. The two elements are uniformly and closely associated throughout the length of the rod. The proportion of aluminum is at least 7.5% but not over 20% by weight.

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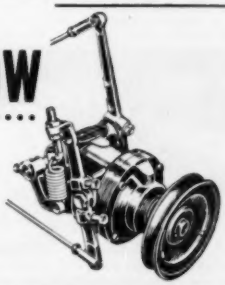

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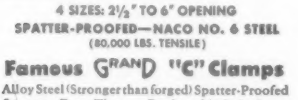

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2,611,710. HERBERT J. WOOCK, Alhambra, Calif. Filed Dec. 17, 1949. Granted Sept. 23, 1952.

This newly patented hard-facing alloy comprises a mixture of two alloys and a welding flux. Proportions are about 84% for the first alloy, 10% of the second alloy and 6% of the flux. The first alloy results from the melting, pigging and crushing of a mixture comprising 10% cobalt, 42% ferrochromium, 18% ferromanganese, 10% boron, 10% ferrosilicon and 10% ferromolybdenum. The second alloy results from the melting, pigging and crushing of about 80% nickel and about 20% ferrosilicon.

* * *

Electrode and its Manufacture

2,612,583. ARTHUR A. BERNARD, Chicago. Filed July 30, 1946. Granted Sept. 30, 1952.

This patented method of producing a welding electrode includes the steps of isolating the metal of the upper half of a rimmed steel ingot. This metal is hot rolled to produce rod stock. This is further cold worked to reduce its cross-sectional area in successive gradual stages to not much more than 25% of its initial cross-sectional area. This is done while maintaining the temperature of the steel below the detrimental point with respect to the arc-influencing effect of the cold working.

* * *

Flame-Cutting Structural Shapes

2,606,754. JOSEPH H. TYRNER, New York City. Assigned to Air Reduction Co., Inc. Filed Sept. 3, 1948. Granted Aug. 12, 1952.

This patent refers to a cutting machine of the gas torch type including a bed for supporting a workpiece and a ram movable horizontally toward and away from the workpiece. The ram is movably supported on a platform to one side of the workpiece. A carriage supported on the ram is vertically movable with respect to the ram. A cutting torch is carried by the ram and another is carried by the carriage. A probe is carried by the ram and is adapted to contact a workpiece. The probe is relatively movable with respect to the ram. First drive means move the ram horizontally. Second means independent of the first move the carriage vertically. Control means are connected to both of the drive means and are actuated in response to the degree of movement of the probe on the ram. They are connected to automatically control each of the drive means independently at different degrees of movement of the probe.

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(My commission expires March 30, 1954)

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1/8"	Arcos Chromang	19-9	8,800
1/8"	McKay 5 AM	19-9	1,565
1/8"	Alloyrod Armorarc	19-9	32,245
1/8"	Sureweld Armo	19-9	2,700
5/32"	Page	18-8	3,005
5/32"	Arcos Chromang	19-9	9,750
5/32"	McKay 5 AM	19-9	11,620
5/32"	Alloyrod Armorarc	19-9	900
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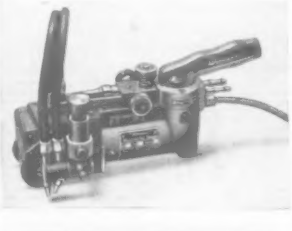

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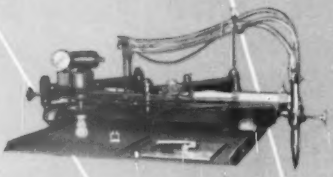

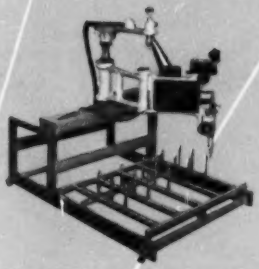

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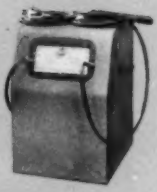

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